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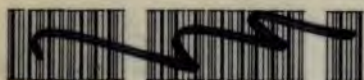
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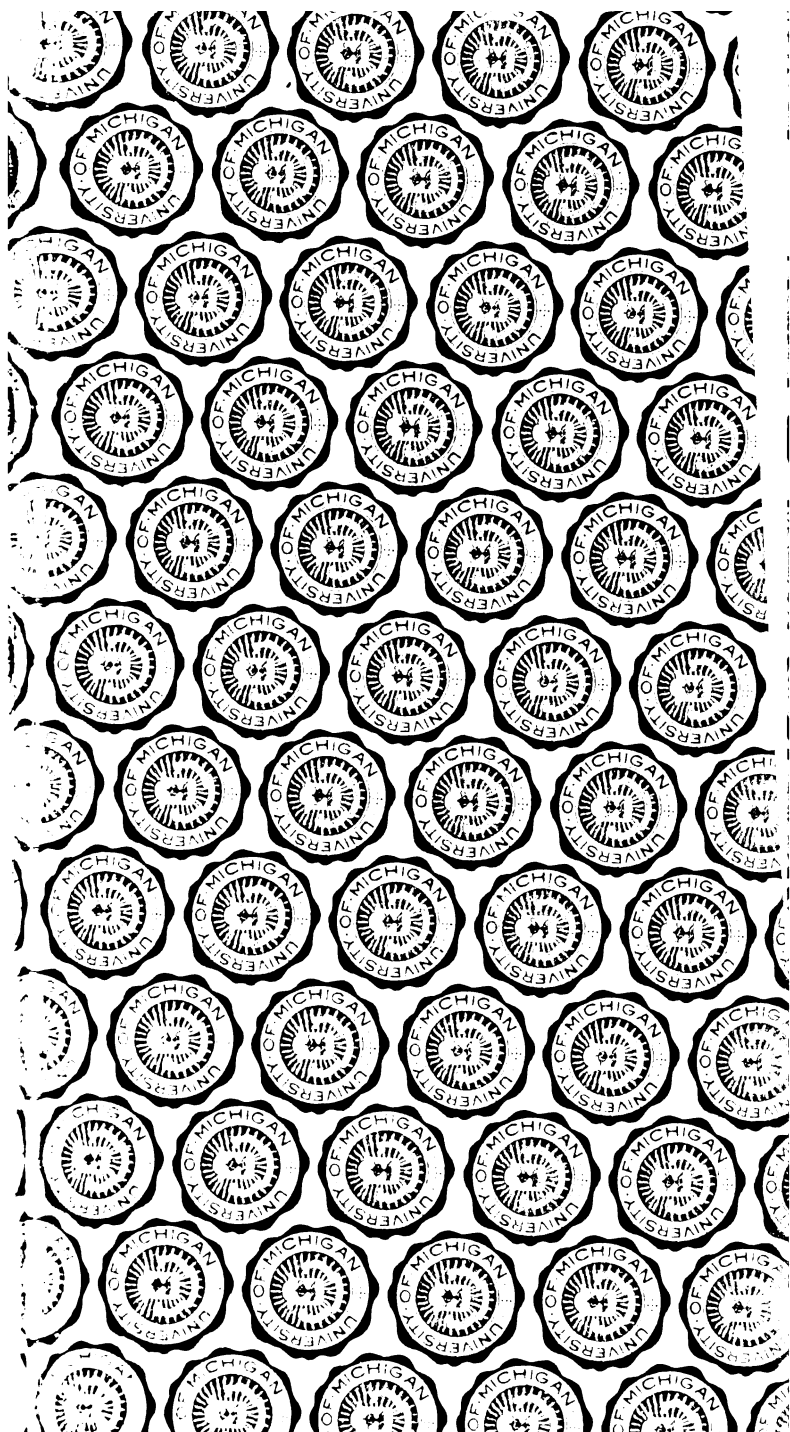
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**BRITISH FUNGUS-FLORA.**





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BRITISH  
FUNGUS-FLORA.

A CLASSIFIED TEXT-BOOK OF MYCOLOGY.

BY  
GEORGE MASSEE,  
AUTHOR OF "PLANT LIFE," "THE PLANT WORLD," ETC.

*IN THREE VOLUMES.*

VOL. I.

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## P R E F A C E.

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IT is now twenty-one years since the last complete British Mycological Flora was published—Cooke's "Handbook of British Fungi"—the number of species therein described being 2810, whereas the species now number 4895, and are distributed as follows :—Basidiomycetes, 1930 ; Ascomycetes, 1275 ; Sphaeropsideae, 685 ; Hyphomycetes, 580 ; Uredineae and Ustilagineae, 230 ; Phycomycetes, 145.

In the Basidiomycetes, with which the present volume deals, the specific characters are mainly derived from morphological features, with the additional physiological characters furnished by colour, smell, and taste, and are consequently not so readily determined as in some of the other groups, where the size of the spores in microns is by many considered, along with a knowledge of the host, to be all that is required for the discrimination of species ; and when we bear in mind that no two persons ever succeed in making the same measurements of the spores of a given species, else the spores are very variable in the same species, the great increase in number of microscopic fungi is not to be wondered at.

There are no better marked species to be met with anywhere in the vegetable kingdom than in the *Agaricinae*, but the majority of species vary within certain limits. I have



observed this varietal difference to be very clearly marked between many species common to the north and south of England respectively, and the differences are in many cases yet more strongly emphasized in forms of the same species from different countries. To the expert, these modifications rarely cause embarrassment, but with the beginner the case is very different, and trivial modifications that do not in any way affect the true specific character, are not unfrequently considered as indicating a distinct species.

It is one thing to recognise a species by some unimportant mark that may be constant in one locality, and another to thoroughly grasp the true specific characters that remain constant in every locality. With the object of lessening the difficulties indicated above, in addition to the specific diagnosis, extracts have been given from one or more authorities, describing minor variations of colour, texture, form, &c., in the case of species prone to variation. The various works of the late Professor Elias Fries of Upsala, have served as the basis from whence specific characters have been drawn up, and in cases where the description covers the typical British form, have been given intact. It is hoped that all sources of information have been acknowledged.

As all the individuals of a given species are not cast in the same mould, it will be understood that the various measurements given apply to the average size of the part indicated.

G. MASSEE.

*Kew, Surrey, 1892.*

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# FUNGUS-FLORA.

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## INTRODUCTION.

### NATURE AND ORIGIN OF FUNGI.

IN a systematic work the very fascinating study of fungi, comprising general morphology, life-history, &c., can receive but very brief attention; nevertheless, a clear knowledge of such is indispensable to an intelligible appreciation of systematic work, which, if based on the system of natural affinities, is the outcome of a correct knowledge of the morphological and physiological peculiarities of the members under consideration.

Fungi belong to the division of plants known as Cryptogams, amongst which they are conspicuous by the entire absence of chlorophyll. This peculiarity determines the mode of life of the fungi, and limits their distribution to those places where organic matter is present, which serves as food, as owing to the absence of chlorophyll inorganic matter cannot be assimilated. Those fungi that feed on dead organic substances, as decaying wood, vegetable humus, &c., are called *saprophytes*; whereas those that derive their food from living plants or animals are known as *parasites*. Some species are saprophytes during one period of their existence and parasites at another.

Fungi are not the only Cryptogams devoid of chlorophyll; two other groups, the Myxomycetes or Mycetozoa, and the Schizomycetes or Bacteria agree in this point, but these latter are distinguished by the absence of hyphae or mycelium. The tissues of fungi always consist of rows of cells, called *hyphae*; these may consist of very long continuous cells without transverse septa, or septa may be present, when



the hypha consists of a row of superposed cells. In numerous species the hyphae form a loose, yielding structure, as in the common mushroom, where they are arranged in a more or less parallel manner in the stem or *stipe*, or intricately interwoven, as in the cap or *pileus*. In perennial species, on the other hand, the hyphae are compacted to form a dense, elastic, corky tissue; or, in some species of *Polyporus*, the substance becomes dark-coloured and as hard as wood. The loose, floccose hyphae forming the vegetative portion of the fungus is called the *mycelium*, or spawn. In many species certain of the hyphae become differentiated into *laticiferous hyphae*, and contain a dense, granular liquid called *latex*, or 'milk,' as usually described in systematic works; such cells are exceedingly abundant in the genus *Lactarius*, and constitute one of its specific characters, the 'milk,' or latex, escaping in drops when the tissue is broken. Laticiferous cells are also present in many other genera.

The Fungi are considered as having descended from the algae, the initial phase of departure being the suppression of chlorophyll, after which they gradually adopted an aerial mode of life; and at the present day we recognise two primary lines of departure and specialisation, the *Ascomycetes* and the *Basidiomycetes*. The first-named group is oldest in point of time, and, as would be expected, is structurally most in touch with the algae, especially the lower or algal-like forms, such as *Pythium*, *Saprolegnia*, &c., which differ from certain algae, as *Vaucheria*, more especially in the absence of chlorophyll, in other respects the general structure is almost identical; such fungi are in many instances aquatic, and possess sexual organs of functional value, an *antheridium*, or fertilising body—male—and a large cell, or oogonium—female—the contents of which, after fertilisation, become capable of reproducing the species; the fertilised bodies contained within the oogonium, or mother-cell, are called *oospores*, and the leading idea of the *Ascomycetes* is that of producing the reproductive bodies or spores in a mother-cell, where they remain till mature. As the evolution of the *Ascomycetes* proceeds, the sexual organs are gradually suppressed, until eventually the spores are produced in a mother-cell or *ascus* without the intervention of any sexual process. Along with the above mode of reproduction, a second or

asexual mode is usually present in most species, consisting of minute, differentiated, spore-like bodies, borne at the tips of special branches, and not enclosed in mother-cells or asci, but naked. Such reproductive bodies are termed *conidia*, which in many instances have been proved to reproduce the fungus either directly or indirectly, as the spores produced in asci—*ascospores*—do.

In many of the Ascomycetes the conidia and higher ascospores are produced by the same structure, the two forms of reproductive bodies either appearing at the same time, or more frequently the conidia appear first, the ascospores being produced at a later stage. In other species the conidia and ascospores are respectively borne by two morphologically and organically distinct structures, which are often so dissimilar in general appearance, that before the relationship between the two was known they were placed in different genera, or even in different families.

As already mentioned, a marked feature in the evolution of the Ascomycetes is the gradual suppression of the sexual organs of reproduction, accompanied by a corresponding evolution and differentiation of the sexual mode of reproduction. On the total disappearance of the sexual mode of reproduction, we find the second great group of fungi—the Basidiomycetes—gradually evolving through the *Ustilagineae*, and the *Uredineae*, families including the well-known ‘bunt,’ ‘rust,’ and ‘smut’ of our cereals, until finally, the characteristic features of the Basidiomycetes are clearly indicated in the *Tremellineae*, and the *Thelephoreae*, the most prominent character being the production of naked spores—that is, not formed in a mother-cell—at the tips of large, terminal cells known as *basidia*; as a rule each basidium bears four spores, sometimes called *basidiospores*, at its apex. The basidia are packed side by side, their tips bearing the spores forming the free surface of the structure, the whole constituting the *hymenium*, or spore-bearing surface. The further evolution of the Basidiomycetes is most evident in connection with the development of the *sporophore* for the two purposes of providing the greatest possible area of hymenium or spore-bearing surface with the least possible expenditure of material, and also for the most effective means of spore dissemination.

The mycelium or vegetative portion of a fungus, being concerned in obtaining and assimilating food, is usually buried in the *substratum* or *matrix* from which the fungus obtains its food, whereas the portion that appears in the air has to do entirely with the reproductive phase, in other words is either directly or indirectly concerned with the production of spores, and collectively constitutes the *sporophore*, which in turn receives special names in the different groups, or in complicated cases different parts are individualised; for example, in the common edible mushroom (*Agaricus campestris*), the vegetative portion or mycelium is buried in the ground, the whole of the above-ground structure being the highly differentiated sporophore, consisting of a *stipe* or stem, and a *pileus* or cap. A *veil* is also present in the form of a thin membrane stretched from the stem to the margin of the pileus for the purpose of protecting the gills during the young stage, while the spores are growing, the whole of this complex sporophore being for the purpose of producing spores on the gills or *lamellae*, protecting them during their development, and assisting in their dispersion at maturity.

In addition to the two primary groups of fungi indicated above there exist others, included under the families known as *Hyphomycetes*, *Melanconieae*, &c. Most of the forms included in these families are minute, and popularly known as 'moulds,' 'mildews,' &c.; many such have of late years been proved to be phases in the life-cycle of higher fungi, mostly belonging to the *Ascomycetes*. Numerous species, however, yet remain without any indicated connection with higher forms, and consequently must for the present be considered as species.

Fuller morphological and physiological information respecting the fungi, in addition to their evolution and inter-relationship, will be found in a work I have previously written on Cryptogamic Botany.\*

\* 'The Evolution of Plant Life : Lower Forms.'

## BASIDIOMYCETES.

Naked spores borne on basidia are, as already stated, the morphological features that are supposed to be indicative of relationship amongst thousands of fungi, which in every other particular are frequently very dissimilar. A typical basidium is the club-shaped terminal cell of an ordinary hypha that becomes densely filled with protoplasm. From the rounded apex of the basidium four very slender spine-like processes—the *sterigmata*—are produced; the tip of each sterigma becomes swollen, the swollen portion becoming differentiated into a spore.

In primitive types of Basidiomycetes the hymenium covers the entire exposed surface of the sporophore, which shows but little differentiation, as in *Tremella*, *Corticium*, &c. In the last-named genus and its allies, the sporophore resembles a crust-like expansion closely *adnate* or attached to the matrix throughout its entire surface, when it is said to be *resupinate*, the upper or free surface being entirely covered by the hymenium. The next phase of evolution towards the highest form is where a greater or less portion of the crust-like sporophore is free from the matrix and *reflexed* or curved downwards; this condition of things is seen in many species of *Stereum*. A third type, the *dimidiate* stage, is illustrated by many species of *Polyporus* that are attached by a broad edge to the matrix, the fungus standing out at right angles to the matrix, and often of a more or less semicircular form, the upper barren surface being the pileus, the under fertile surface the hymenium.

Following on, we come to species with a *lateral stem*, due to the broad base of attachment of the dimidiate type being narrowed to stem-like dimensions. Finally we come to *mesopod* or central-stemmed species, as seen in the mushroom.

In all the higher forms, the hymenium is continuously spread over both surfaces of thin plates of tissue, which are variously arranged in different groups, and furnish important

characters; these plates take the form of gills or *lamellae* in *Agaricus*, &c., *pores* in *Polyporus*, *Boletus*, &c., or are variously contorted and form a cavernous structure in *Lycoperdon*, *Rhizopogon*, &c.

No trace of sexual organs is known to exist in any member of the group.

The *Basidiomycetes* are divided into two primary groups, briefly characterised as follows:—

#### HYMENOMYCETES.

Hymenium exposed from the first, or in all cases before the spores are mature.

#### GASTROMYCETES.

Hymenium enclosed within a continuous membrane or peridium until the spores are mature.

#### GASTROMYCETES.

Opinion differs as to the origin or starting-point of the peculiar features that give individuality to the present group. The late Professor De Bary saw in some points of resemblance with certain species of *Polyporus* the probable starting-point of the group under consideration.\* The *Hymenogastreae*, including the comparatively simple subterranean species, are universally considered as the starting-point from which all the other families of the Gastromycetes have been derived, and I have indicated the very close agreement in many important points of structure, habitat, &c.,† between the *Hymenogastreae* and the *Tuberaceae*, an ascigerous family of subterranean fungi including the truffle, and consider that the Gastromycetes have evolved from the *Tuberaceae* through the *Hymenogastreae*, due to the gradual conversion of asci into basidia.

In the simplest subterranean forms there is a continuous external compact wall or *peridium*, which remains perfectly closed until the spores are mature, and even then shows no

\* 'Fungi Mycetozoa and Bacteria.' Eng. Ed.

† 'A Monograph of the British Gastromycetes,' 'Annals of Botany,' vol. iv. 1889.

special arrangement for *dehiscence* or opening, but has to decay before the spores are liberated. In species that become raised above ground during their development the peridium is usually differentiated into two or more layers, as, for instance, in the species of *Lycoperdon*, where the outer layer is usually resolved into warts or spines, the inner layer remaining continuous, or in *Geaster*, where the number of layers is greater, an outer portion (*exoperidium*) eventually splitting from the apex into a variable number of pointed portions, the inner, as in *Lycoperdon*, remaining intact and dehiscing by a more or less definite aperture at the apex. The entire contents of the closed peridium are collectively known as the *gleba*, which in the immature stage, before any disintegration has taken place, consists of thin plates of tissue continuous with the inside of the peridium and anastomosing at numerous points, thus forming an irregular labyrinthiform or cavernous structure consisting of variously-shaped cavities bounded by thin plates, which are in every respect, except that of arrangement, identical with the gills of *Agarics*, and consequently bear the basidia on their free surfaces, which is equivalent to saying that the walls of the cavities are covered with basidia bearing spores and forming the hymenium.

The central portion of these plates consists of hyphae running more or less parallel with the two surfaces and constituting the *trama*, lateral branches of which bend outwards on both sides and bear the basidia. In addition to the basidia, certain tramal hyphae give origin in many species to elongated, thick-walled, simple or branched hyphae which collectively form the *capillitium* or dense mass of threads mixed with the mature spores in *Lycoperdon*, *Geaster*, &c., and which, in its most highly-evolved phase acts as a dispersive organ. In many genera, as *Bovista*, *Lycoperdon*, &c., after the spores are formed the basidia, along with the tramal plates, deliquesce and totally disappear, becoming partly resolved into water that saturates the gleba of immature puff-balls; finally, this moisture disappears, the spores become mature and form a dusty mass, mixed with the capillitium threads.

In the species of *Cyathus* and *Nidularia* the tramal plates do not deliquesce at maturity, but split along a central line,

thus forming a number of free, closed, hollow bodies or *peridiola*, the inner surface being lined with basidia. These fungi are popularly known as birds'-nest fungi, the open peridium corresponding to the nest and the peridiola to the eggs.

In some of the subterranean species the basal portion of the peridial wall is more or less thicker than the remainder, and in the above-ground species this thickened portion or *sterile base* is much more highly developed, and, as its name denotes, is sterile, or does not produce basidia and spores. In the species of *Lycoperdon*, &c., the sterile base is developed downwards as a *stem*, in other species it grows upwards into the gleba as a more or less cylindrical, compact, sterile, hemispherical, or column-like pillar, called the *columella*.

In the sub-family *Phalloideae* the outer covering or peridium is termed the *volva*, and the hymenium is elevated on a variously-formed *receptacle*. When the spores are formed the hymenial elements, basidia, &c., deliquesce and form in most species a very strong-smelling, green, semi-liquid, dripping mass, in which the spores are imbedded. This green substance contains a considerable amount of a saccharine substance, which is greedily sought after by flies, through whose agency the spores are supposed to be dispersed. In many species the receptacle is brilliantly coloured, thus serving as an additional attraction to their insect visitors. No trace of a capillitium is present.

### GASTROMYCETES.

Subterranean, or appearing above-ground when mature; hymenium concealed within a continuous peridium or volva until the spores are formed. Basidia variable, cylindrical, clavate, or sub-globose; spores produced laterally (*Tulostoma*) or at the apex of the basidia, variable in number, often more than four, always continuous (= one-celled or without septa). Capillitium often present.

#### *Fam. I. HYMENOGASTREAE.*

Subterranean. Peridium indehiscent; capillitium absent.

*Fam. II. SCLERODERMEAE.*

Appearing above ground at maturity. Peridium thick, not composed of distinct layers, dehiscing irregularly; capillitium absent.

*Fam. III. NIDULARIEAE.*

Peridiola globose or compressed, free at maturity within the peridium.

*Fam. IV. LYCOPERDEAE.*

Peridium consisting of two or more distinct layers; spores forming a powdery mass at maturity, and mixed with a well-developed capillitium.

*Fam. V. PHALLOIDEAE.*

Volva at first continuous, with a middle gelatinous stratum, spores when mature immersed in a greenish mucilage, and elevated out of the volva on a variously-shaped receptacle.

*ANALYSIS OF THE GENERA.*

## HYMENOGASTREAE.

**Octaviania.**—Sterile base of peridium well developed; spores globose, warted.

**Melanogaster.**—Sterile base of peridium absent; spores elliptical, smooth.

**Hydnangium.**—Peridium without a sterile base; spores globose, warted.

**Hysterangium.**—Gleba cartilagineo-glutinous; spores minute, elliptical, smooth.

**Rhizopogon.**—Peridium with vein-like fibres on the surface; spores smooth.

**Hymenogaster.**—Sterile base of peridium well developed; spores large, elliptical or fusiform, rugulose or nodulose.



## SCLERODERMEEAE.

**Scleroderma.**—Surface of peridium with persistent warts or granules.

**Polysaccum.**—Surface of peridium smooth.

## NIDULARIEAE.

**Cyathus.**—Peridiola several, umbilicate, attached by a cord to wall of peridium.

**Crucibulum.**—Peridiola several, not umbilicate, attached by a cord to wall of peridium.

**Nidularia.**—Peridiola several, not attached by a cord to the peridium.

**Sphaerobolus.**—Peridium globose, containing a single sporidiolum.

**Thelebolus.**—Peridium sessile on a broad base, containing a single sporidiolum.

## LYCOPERDEAE.

\* *Stem absent, or very thick and continuous with the peridium.*

**Lycoperdon.**—Exoperidium either in the form of warts, spines, or flaking off in patches; sterile base either present or absent.

**Geaster.**—Exoperidium splitting in a stellate manner.

\*\* *Stem elongated, slender.*

**Tulostoma.**—Peridium subglobose.

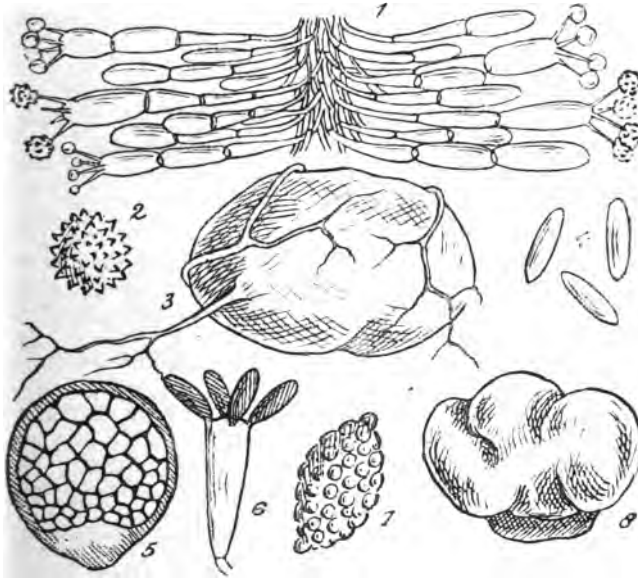
**Battarrea.**—Peridium vertically compressed.

## PHALLOIDEAE.

**Ithyphallus.**—Pileus reticulated, free and sheathing the apex of the stem-like receptacle.

**Mutinus.**—Pileus adnate to the apex of the long stem-like receptacle.

**Clathrus.**—Receptacle forming a hollow net.



## FIGURES ILLUSTRATING THE HYMENOGASTREAE.

Fig. 1, *Octaviania asterosperma*, portion of a tramal plate showing the hyphae of the trama bending outwards and bearing the basidia on both surfaces; the young spores are smooth; highly mag.;—Fig. 2, *Hydnangium carneum*, spore very highly mag.;—Fig. 3, *Rhizopogon rubescens*, plant nat. size;—Fig. 4, *Hysterangium nephriticum*, spores highly mag.;—Fig. 5, *Hymenogaster tener*, section through centre of plant, showing the continuous peridium with the thickened sterile base, also the tramal plates forming an irregular network in the gleba; nat. size;—Fig. 6, *Melanogaster variegatus*, basidium bearing four spores; highly mag.;—Fig. 7, *Hymenogaster decorus*, spore; highly mag.;—Fig. 8, *Hymenogaster citrinus*, plant; nat. size.

## FAM. I.

## HYMENOGASTREAE.

Peridium indehiscent; gleba consisting of numerous irregular cavities; capillitium absent; subterranean.

*Hymenogastreae*, Tul., Fl. d'Alg. i. p. 394.

Mass., Mon. Gast., p. 31.

*Hypogaei*, Berk., Outl., p. 292.

Most of the species are of an irregular spherical form, and in many cases originate from a fleecy web of mycelium. Most species grow under trees, and several have only been met with in close proximity to certain kinds of trees, which suggests the probability of commensalism, as already known to exist between the subterranean species of *Elaphomyces* and fir-trees. The basidia are very variable in form and in the number of sterigmata. The spores are remarkable, as a rule, for their very large size, dark colour and markings. The peridium is not differentiated into layers in connection with spore-diffusion, and decays to liberate the spores.

## OCTAVIANIA. Vitt. (fig. 1, p. 11.)

Peridium cottony, sterile base distinct; trama byssoid with a tendency to split; cavities at first empty, small towards the circumference, central ones larger and irregular; spores rough.

*Octaviana*, Vitt., Mon. Tub., p. 15 (in part); Mass., Mon. Gast., p. 31.

Characterised by the distinct sterile base, the byssoid septa, and in the cavities being at first empty.

*Octaviana asterosperma*. Vitt. (fig. 1, p. 11.)

Subglobose or irregular, whitish, becoming bluish-black in places, sterile base distinct; cavities irregular, central ones largest; spores globose, warted, brown, 14-15,  $\mu$ .

*Octaviana asterosperma*. Vitt., Mon. Tub., t. iii. p. 7; Cke., Hdbk., n. 1045; Berk., Outl. 292; Mass., Mon. Gast., p. 31, f. 2.

Adhering to branches, leaves, &c., underground.

From  $\frac{1}{2}$  to  $1\frac{1}{2}$  in. across, mycelium cottony, abundant; whitish, becoming stained with greenish-blue or black when bruised and exposed to air.

**Octaviana Stephensii.** Tul.

Irregularly elongated, rufous, base more or less plicate, with branched cord-like mycelial strands; within white, becoming red when exposed; cavities minute; spores globose, echinulate, pale brown, 11–17  $\mu$ .

*Octaviana Stephensii*, Tul., Fung. Hypog. 78, pl. xxi., f. vi.; Mass., Mon. Gast. p. 32, f. 3.

*Hydnangium Stevensii*, Berk., Ann. Nat. Hist. xviii. p. 76.

Amongst loose soil; from  $\frac{1}{2}$  to  $\frac{3}{4}$  in. across; giving out a white milk-like fluid when cut.

**Octaviana compacta.** Tul.

Small, gregarious, irregularly globose, whitish, minutely cottony, furnished with a dense mass of white mycelium; cavities irregular, septa indistinct; spores minutely warted, yellow, 5–6  $\mu$ .

*Octaviana compacta*, Tul., Giorn. Bot. Ital. ii. p. 56; Mass., Mon. Gast., p. 32, f. 12.

Underground or partly exposed; from  $\frac{1}{4}$  to  $\frac{1}{2}$  in. across.

**MELANOGASTER.** Corda. (fig. 6, p. 11.)

Peridium without a distinct sterile rooting base, branched root-like mycelial strands springing from every part of the surface; cavities of gleba small at the circumference, larger in the centre; tramal plates thick; spores smooth, coloured or colourless.

*Melanogaster*, Corda, ap. Sturm., Deutsch. Fl. iii. 11, p. 1; Mass., Mon. Gast., p. 33.

The present genus is characterised by the smooth spores, absence of sterile rooting base, and the cord-like strands of mycelium springing from various points of the surface of the peridium.

**Melanogaster variegatus.** Tul. (fig. 6, p. 11.)

Subglobose, ochraceous or yellowish, then ferruginous; tramal plates changing from white to orange; spores brown, elliptic-oblong,  $10 \times 5 \mu$ .

*Melanogaster variegatus*, Tul., Fung. Hypog. 92, t. xi. f. 4, and t. xii. f. 6; Mass., Mon. Gast., p. 33, f. 10.

Underground.

*Var. Broomeianus*, Berk. Differs from type in not having yellow or orange tramal plates.

*Melanogaster ambiguus*. Tul.

Subglobose or ellipsoid, foetid, pale olive becoming brownish when exposed; septa white, spores obovate or elliptical, apex variable, acute or obtuse and papillate, brown,  $13-15 \times 7-8 \mu$ .

*Melanogaster ambiguus*, Tul., Fung. Hyp. 94, t. ii. f. 5, and t. xi. f. 5; Berk., Outl. 293; Cke., Hdbk., n. 1048; Mass., Mon. Gast., p. 35, f. 5.

Under fir, the smell very strong, resembling assafoetida. About 1 in. across.

*Var. intermedius*, Tul. Spores obovate, obtuse, rarely papillate.

#### HYDNANGIUM. Wallr. (fig. 2, p. 11.)

Peridium fleshy or thin, smooth or silky, sterile base absent; cavities minute, irregular, at first empty; spores globose or subglobose, echinulate.

*Hydnangium*, Wallr., MS.; Mass., Mon. Gast., p. 36.

Distinguished from *Hydnangium*, its nearest ally, by the absence of a sterile base and the subglobose echinulate spores.

*Hydnangium carotaecolor*. B. & Br.

Irregularly oblong, peridium thin, rugulose, dull red, orange within; spores elliptic, pale, coarsely echinulate,  $15-18 \times 11-13 \mu$ .

*Hydnangium carotaecolor*, B. and Br., Berk., Outl. 293; pl. xx. f. 1; Cke., Hdbk., n. 1049; Mass., Mon. Gast., p. 36, f. 6.

Buried or half exposed, under trees. From  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long, of a bright carrot-colour within.

*Hydnangium carneum*. Wallr. (fig. 2, p. 11.)

Subglobose or irregular, flesh-coloured, inside paler, unchangeable; spores globose, pale pinkish-brown, with long, slender spines,  $11-12 \mu$ .

*Hydnangium carneum*, Wallr., MS.; Mass., Mon. Gast., p. 37, f. 14.

Underground or partly exposed. About  $\frac{3}{4}$  in. across.

**HYSTERANGIUM.** Vitt. (fig. 4, p. 11.)

Peridium distinct, separable; gleba at first mucilaginous, becoming gelatinous, cavities at first empty; spores minute, smooth.

*Hysterangium*, Vitt., Mon. Tub., p. 13; Mass., Mon. Gast., p. 37, f. 4.

Known by the cartilaginous nature of the mature gleba, separable peridium, and minute elliptical, smooth spores. There is often an abundant development of mycelium.

**Hysterangium nephriticum.** Berk. (fig. 4, p. 11.)

Spherico-depressed, mycelium white, strand-like; peridium rather thick; gleba tinted with grey or dirty green; cavities minute, irregular, radiating from the base; spores pale, elliptical,  $18-20 \times 5-6 \mu$ .

*Hysterangium nephriticum*, Berk., Outl. 294; Cke., Hdbk., n. 1050; Mass., Mon. Gast., p. 38, f. 4.

Amongst clay, &c. From  $\frac{1}{2}$  to 1 in., at first white, downy, springing from a dense mat of root-like mycelium.

**Hysterangium Thwaitesii.** B. & Br.

White, subglobose, becoming reddish when bruised; spores oblong, apiculate, pale olive,  $25-30 \times 7-9 \mu$ .

*Hysterangium Thwaitesii*, B. and Br., Ann. Nat. Hist., ser. ii. v. ii. p. 267; Mass., Mon. Gast., p. 39, f. 80.

On the ground, under trees. About  $\frac{1}{2}$  in. across. Peridium thin, separating when dry.

**RHIZOPOGON.** Tul. (fig. 3, p. 11.)

Peridium thick and persistent, or thin and disappearing, with strands of mycelium traversing its surface; cavities distinct, at first empty; spores smooth.

*Rhizopogon*, Tul., Giorn. Bot. Ital. ii. p. 56; Mass., Mon. Gast., p. 39.

Agreeing with *Hysterangium* in the smooth elliptical spores, but distinguished by the root-like strands of mycelium

springing from the general surface of the peridium; in the last character agreeing with *Melanogaster*, from which the present genus is distinct by the minute subequal cavities of the gleba.

**Rhizopogon rubescens.** Tul. (fig. 3, p. 11.)

Irregularly ovate or globose, with long, slender, root-like mycelium, white, becoming reddish when exposed, yellowish-olive when mature, cavities small, numerous; spores elliptic-oblong, very pale,  $11 \times 4-5 \mu$ .

*Rhizopogon rubescens*, Tul., Fung. Hypog. 89, t. xi. f. 4, t. ii. f. 1.; Berk., Outl. 294; Cke., Hdbk., n. 1052; Mass., Mon. Gast., p. 39, f. 7.

Amongst sand in fir-woods. Gregarious,  $\frac{3}{4}$ - $1\frac{1}{2}$  in., smell sour when young, foetid when old.

**Rhizopogon luteolus.** Tul.

Globose or elongated, white, then brownish-olive, peridium thick, with numerous strands of mycelium; cavities minute, rounded; spores narrowly elliptical, pale olive,  $8 \times 3 \mu$ .

*Rhizopogon luteolus*, Tul., Fung. Hypog. 87, t. i., f. 5 and t. xi. f. 5; Mass., Mon. Gast., p. 40, f. 9.

Underground or partly exposed. Solitary or gregarious,  $\frac{3}{8}$ - $1\frac{1}{2}$  in., smell slight when immature, then strong.

**HYMENOGASTER.** Tul. (fig. 5, p. 11.)

Peridium fleshy or thin, continuous with the sterile base; cavities of gleba empty at first, irregularly scattered or radiating from the base, tramal walls not byssoid; spores elliptical or fusiform, rough or smooth.

*Hymenogaster*, Tul., Fung. Hypog., p. 63; Mass., Mon. Gast., p. 41.

Characterised by the large elliptical or fusiform spores, sterile basal stratum, and cavities of the gleba being empty at first.

**Hymenogaster Klotzschii.** Tul.

Obovate or subglobose, base fibrillose, dirty white, becoming reddish-ochre inside; spores elliptical, minutely warted, pale brown,  $18-20 \times 11-13 \mu$ .

*Hymenogaster Klotzschii*, Tul., Fung. Hypog. 64, pl. x. f. xii.; Berk., Outl. 295; Cke., Hdbk., n. 1053; Mass., Mon. Gast., p. 42, f. 24.

Amongst soil. From  $\frac{1}{2}$ – $\frac{2}{3}$  in.

***Hymenogaster muticus*. B. & Br.**

Globose, white, then tinged brown, cracked; pale yellowish-brown within; spores obovate or oblong, obtuse, pale brown,  $18-21 \times 10-12 \mu$ .

*Hymenogaster muticus*, B. and Br., Berk., Outl. 295; Cke., Hdbk., n. 1054; Mass., Mon. Gast., p. 42, f. 20.

Underground, amongst trees. From  $\frac{2}{3}$ –1 in. across.

***Hymenogaster luteus*. Vitt.**

Subglobose, peridium very thin, white, then brownish; bright yellow within; spores smooth, elliptical,  $24-28 \times 10 \mu$ .

*Hymenogaster luteus*, Berk., Outl. 295; Cke., Hdbk., n. 1055; Mass., Mon. Gast., p. 43, f. 18.

Underground. About 1 in. diam., distinguished by the bright yellow inside. Spores rather variable in shape and size. Smell sometimes weak, at others very foetid.

***Hymenogaster decorus*. Tul. (fig. 7, p. 11.)**

Subglobose, dirty white, becoming yellowish in places; inside lilac-brown, then blackish; sterile base almost obsolete; spores elliptical, obtuse, or obtusely apiculate, ochraceous, then brown, rugulose,  $24-28 \times 13-15 \mu$ .

*Hymenogaster decorus*, Tul., Fung. Hypog. 67, t. x. f. 9; Berk., Outl. 295; Cke., Hdbk., n. 1056; Mass., Mon. Gast., p. 43, f. 22.

Underground in woods. From 1–2 in. across. Remarkable for the long, slender basidia.

***Hymenogaster vulgaris*. Tul.**

Irregularly subglobose, whitish, becoming discoloured; rather soft; gleba from white to dark brown, cavities rather large, irregular; sterile base minute; spores oblong-lanceolate, dark brown when mature, rugulose,  $30-40 \times 12-14 \mu$ .

*Hymenogaster vulgaris*, Tul., Fung. Hypog. 67, t. x. f. 13; Berk., Outl. 296; Cke., Hdbk., n. 1057; Mass., Mon. Gast., p. 44, f. 13.



Underground. Subglobose, or irregularly lobed, solitary or gregarious, about 1 in.

***Hymenogaster pallidus*. B. & Br.**

Subglobose or depressed; white, then dirty buff, rather soft, sterile base obsolete; within at first white, passing through yellow to pale brown; spores lanceolate, acute, rather rough, brown,  $30-36 \times 12-14, \mu$ .

*Hymenogaster pallidus*, B. and Br., Berk., Outl. 296; Cke., Hdbk. 1058; Mass., Mon. Gast., p. 44, f. 17.

Underground under firs. From  $\frac{1}{4}-\frac{1}{2}$  in., distinguished from *H. vulgaris* by its paler colour and more acute spores, which usually fall away with the short sterigma attached.

***Hymenogaster citrinus*. Vitt. (fig. 8, p. 11.)**

Subglobose, often gibbous, shining as if silky; yellow, then rufous-black, same colour within; spores lanceolate, apiculate, reddish-brown, rugulose,  $40 \times 17-20 \mu$ .

*Hymenogaster citrinus*, Vitt., Berk., Outl. 296; Cke., Hdbk., n. 1057; Mass., Mon. Gast., p. 45, f. 8.

Underground. From  $\frac{3}{4}-1\frac{1}{2}$  in. across. Distinguished by the yellow tramal plates, the large brown, lanceolate spores, and the cheesy smell.

***Hymenogaster olivaceus*. Vitt.**

Angularly globose, at first silky, whitish, brownish when bruised; inside white at first, then passing through buff to olive, tramal plates persistently white; spores broadly fusiform, mucronate, brown, generally quite smooth,  $25-30 \times 13-14 \mu$ .

*Hymenogaster olivaceus*, Vitt., Berk., Outl. 296; Cke., Hdbk. 1060; Mass., Mon. Gast., p. 45, f. 16.

Underground in woods. Size variable, from  $\frac{3}{4}-1\frac{1}{2}$  in. Allied to *H. citrinus*: distinguished by its paler and smoother spores; in fact, the spores are generally quite smooth, sometimes slightly rugulose; the sterigmata remain attached to the spores as a rule.

**Var. *modestus*, B. and Br.**

Spores narrowly fusiform, pale amber,  $25-26 \times 8-10 \mu$ .

***Hymenogaster tener*. Berk. (fig. 5, p. 11.)**

Subglobose, rather soft, white, silky, sterile base well

developed; gleba pink, then greyish-amber; spores broadly elliptical with a papilla at the apex, verruculose or rugulose, ochraceous,  $30 \times 14-16 \mu$ .

*Hymenogaster tener*, Berk., Outl. 296; Cke., Hdbk. 1061; Mass., Mon. Gast., p. 46, figs. 1 and 54.

Underground, in woods. From  $\frac{1}{2}$ –1 in. across.

***Hymenogaster Thwaitesii*. B. & Br.**

Globose, firm, dingy white becoming stained in places; gleba brown; spores globose, brown, slightly rugulose, apex with a minute papilla,  $11-13 \mu$ .

*Hymenogaster Thwaitesii*, B. and Br., Berk., Outl. 197; Cke., Hdbk., n. 1162; Mass., Mon. Gast., p. 47, f. 25.

Underground. About  $\frac{1}{2}$  in. across. Characterised by the globose spores.

***Hymenogaster griseus*. Vitt.**

Globose or irregular, at first white, downy, cavities minute; spores fusiform, irregularly tuberculose, dark brown,  $28-32 \times 20 \mu$ .

*Hymenogaster griseus*, Vitt., Mon. Tub. 23, t. iii. f. xv.; Mass., Mon. Gast., p. 48.

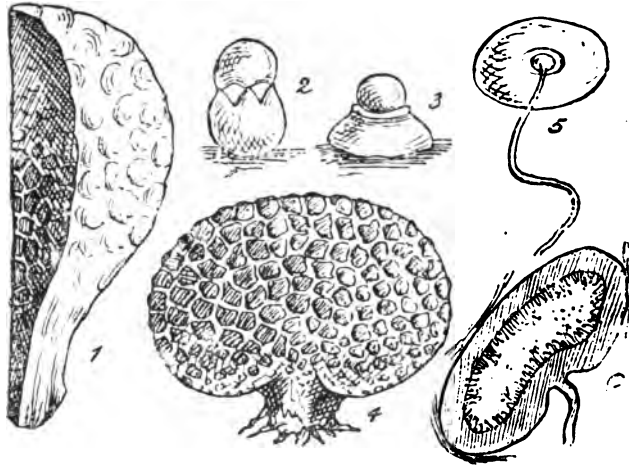
Amongst leaf-soil. From  $\frac{1}{4}$ – $\frac{1}{2}$  in. across. Smell pleasant.

***Hymenogaster pusillus*. B. & Br.**

Very small, obovate or subdepressed, white, sterile base large; cavities large; spores pale, reddish, elliptical, with a papilla, at the apex, at length rugulose,  $14-16 \times 10 \mu$ .

*Hymenogaster pusillus*, B. and Br., Berk., Outl. 297; Cke., Hdbk., n. 1063; Mass., Mon. Gast., p. 48, f. 21.

On mossy ground. About two lines high, obovate or depressed.



FIGURES ILLUSTRATING THE *SCLERODERMEAE*, ALSO  
THE *NIDULARIEAE* IN PART.

Fig. 1, *Polysaccum pisocarpium*, portion of a specimen, showing the nodulose exterior, also a section showing the sporangia; small specimen, nat. size;—Fig. 2, *Sphaerobolus stellatus*, specimen after dehiscence, showing the outer wall of the peridium split in a stellate manner above, and the inner layer elastically inverted, the single peridiolum has been jerked away; slightly mag.;—Fig. 3, *Thelebolus terrestris*, showing the peridium with the single peridiolum at its apex; slightly mag.;—Fig. 4, *Scleroderma vulgare*, entire plant; small specimen, nat. size;—Fig. 5, *Crucibulum vulgare*, peridiolum with portion of the funiculus or cord by which it is attached to the inner wall of the peridium; slightly mag.;—Fig. 6, *Cyathus vernicosus*, peridiolum in section, showing the internal cavity lined with basidia; on one side there is a depression or umbilicus from which the funiculus springs; mag.

*FAM. II.***SCLERODERMEAE.**

Peridium thick, dehiscing by splitting into lobes at the apex, or usually by disintegration of the upper portion; gleba containing numerous cavities, tramal plates disappearing or persistent, capillitium absent. Peridia appearing above ground at maturity.

Distinguished from the *Hymenogastreae* by the well-defined sterile base of the peridium, which usually becomes elongated into a stem-like structure, and by the mature peridium being above ground. The spores are small, yet there is no special arrangement for effecting their dispersion, although in this respect the present order forms a transition between the *Hymenogastreae* and the higher orders.

**SCLERODERMA. Pers. (fig. 4, p. 20.)**

Peridium firm, covered with warts or scales, indehiscent or splitting in an irregularly stellate manner at the apex; walls of trama subpersistent; spores globose, warted.

*Scleroderma*, Pers., Syn., p. 159; Mass., Mon. Gast., p. 49.

Distinguished by the firm, corky peridium covered with warts.

***Scleroderma vulgare*. Fr. (fig. 4, p. 20.)**

Subsessile, often depressed, plicate towards the base, peridium thick, white, verrucose or broken up into minute rigid scales; trama white; spores in the mass blackish with purple tinge, globose, warted, 9–11  $\mu$ .

*Scleroderma vulgare*, Berk., Outl. 303, pl. 15, f. 4 (with *Boletus parasiticus*, growing upon it); Cke., Hdbk. 1090, f. 116; Mass., Mon. Gast., p. 50, f. 45.

Under trees, &c. Often caespitose, 1 to 3 in. across. Peridium variable, white or pale brown, often becoming pink when cut. Dehiscing by decay of upper portion of peridium.

**Scleroderma verrucosum.** Pers.

Peridium thin above, ochraceous or dingy brown, covered with minute warts, subglobose, continued downwards as a more or less elongated stem-like base; spores umber in the mass; trama whitish; spores globose, warted, 10-13  $\mu$ .

*Scleroderma verrucosum*, Berk., Outl. 303; Cke., Hdbk., n. 1092; Mass., Mon. Gast., p. 50, f. 47.

On the ground, under trees, &c. Peridium, 1 to 3 in. across, stem  $\frac{1}{2}$ -2 in. long, thick, lacunose; sometimes almost sessile, when it approaches *S. vulgare*, but is distinguished by the thin peridium and absence of purple tinge in the immature spore mass.

**Scleroderma bovista.** Fr.

Subsessile, often irregular, peridium thin, pliant, almost smooth; tramal walls floccose, yellow, mass of spores olive-brown, spores globose, warted, 10-13  $\mu$ .

*Scleroderma bovista*, Berk., Outl. 303; Cke., Hdbk., n. 1091; Mass., Mon. Gast., p. 51, f. 36.

Sandy soil under trees, &c. From 1-2 in. across. Distinguished by the thin, almost smooth peridium, and the yellow tramal walls.

**Scleroderma geaster.** Fr.

Subglobose, sessile, peridium thick, rigid, almost smooth, splitting in an irregularly stellate manner at the apex; spores warted, 12-16  $\mu$ .

*Scleroderma geaster*, Fr., Syst. Myc., iii. p. 46; Mass., Mon. Gast., p. 51, f. 35.

Sandy places. Known by the peridium dehiscing in a stellate manner; from 1-2 in. across.

**POLYSACCUM.** D.C. (fig. 1, p. 20.)

Peridium irregularly globose, thick, attenuated downwards into a stem-like base, dehiscing by disintegration of its upper portion; gleba with numerous cavities containing peridiola.

*Polysaccum*, D.C., in Desp. and Rapp., Voy. Bot. i. p. 8; Mass., Mon. Gast., p. 52.

Allied to *Scleroderma* and distinguished by the cavities of the gleba containing distinct peridiola.

**Polysaccum pisocarpium.** Fr. (fig. 1, p. 20.)

Peridium irregularly globose, indistinctly nodulose, passing downwards into a stout stem-like base; peridiola irregularly angular,  $4-5 \times 2-3$  mm., yellow; spores globose, warted, coffee-colour,  $9-13 \mu$ .

*Polysaccum pisocarpium*, Mass., Mon. Gast., p. 52, f. 53.

*Polysaccum olivaceum*, Berk., Outl. 304; Cke., Hdbk., n. 1093.

*Lycoperdon capsuliferum*, Sow., Engl. Fung., tab. 425.

Amongst sand. Peridium olive with brown tinge, 1-3 in. across, stem stout  $\frac{1}{2}$ -1 in. long. Has not been met with since Sowerby's time.

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**FAM. III.****NIDULARIEAE.**

Spores produced in the interior of one or usually several indehiscent peridiola enclosed in a common peridium.

*Nidulariae*, Mass., Mon. Gast., p. 53.

*Nidulariaceae*, Tul., Mon. Nid., Ann. Sci. Nat., sér. 3, i. p. 64 (in part).

The leading idea of the present group is the complete differentiation of the peridiola, which were mistaken by the early mycologists for the reproductive bodies. In *Poly-saccum* the peridiola are present, but not so completely free, owing to the persistence to some extent of the tramal plates.

**CYATHUS.** Haller. (fig. 6, p. 20, and fig. 7, p. 28.)

Peridium consisting of three layers, apex at first closed by a membrane (epiphragm), becoming broadly open; peridiola compressed, umbilicate, attached to peridium by an elastic cord (funiculus).

*Cyathus*, Haller, Helv. V., p. 127; Mass., Mon. Gast., p. 54.

Marked by the three layers forming the peridium (seen in a microscopic section) and the peridiola, with a depression or umbilicus in the centre of one of the flattened sides from which the funiculus springs.

**Cyathus striatus.** Hoffm. (fig. 7, p. 28.)

Obconic, apex truncate, at first closed by a pale epiphragm; lead-colour and striate within, outside hirtotomentose, brownish, peridiola subcircular, compressed, about 2 mm. across; spores elliptic-oblong, colourless, smooth,  $18-22 \times 10 \mu$ .

*Cyathus striatus*, Berk., Outl. 312, pl. 2, f. 3; Cke., Hdbk., n. 1199; Mass., Mon. Gast., p. 54, f. 48.

On wood, twigs, fir-cones, &c. Fasciculate; from  $\frac{1}{2}$ – $\frac{2}{3}$  in. high. Distinguished by the fluted inside of the peridium.

**Cyathus vernicosus.** D.C. (fig. 6, p. 20.)

Campanulate, becoming broadly open, inside smooth, even, outside silky becoming smooth; peridiola circular, biconvex, blackish, 3–4 mm. across; spores elliptical, colourless,  $12-14 \times 10 \mu$ .

*Cyathus vernicosus*, Berk., Outl. 312, pl. 21, f. 1; Cke., Hdbk., n. 1199; Mass., Mon. Gast., p. 55, f. 49–51.

On the ground. Clustered; about  $\frac{1}{2}$  inch high.

**Var. agrestis.**

Smaller than type, hemispherical, erect.

**CRUCIBULUM.** Tul. (fig. 5, p. 20, and f. 8, p. 28.)

Wall of peridium double, thick, at first continuous over the apex as a flat epiphragm; peridiola numerous, compressed, attached to the peridium by a long cord (funiculus) which springs from a nipple-like tubercle situated centrally on one of the flattened surfaces of the peridiolum.

*Crucibulum*, Tul., Mon. Nid., Ann. Sci. Nat., sér. 3, v. i., p. 89; Mass., Mon. Gast., p. 56.

Distinguished from *Cyathus*, its nearest ally, by the peridial wall consisting of two layers only, and in the funiculus springing from a projection, and not from a depression or umbilicus on the flattened side of the peridiolum.

**Crucibulum vulgare.** Tul. (fig. 5, p. 20, and fig. 8, p. 28.)

Peridium thick, greyish-buff, smooth and shining inside, minutely tomentose outside; peridiola circular, biconvex, pale, 1.5–2 m.m. across; spores elliptic-oblong, smooth, colourless,  $10 \times 5-6 \mu$ .

*Crucibulum vulgare*, Berk., Outl., p. 312, pl. 2, f. 1; Cke., Hdbk., n. 1200; Mass., Mon. Gast., p. 56, f. 52.

On wood, twigs, &c. Becoming bell-shaped and broadly open, about  $\frac{1}{4}$  in. across. Gregarious or crowded.

**NIDULARIA.** Tul. (fig. 6, p. 28.)

Peridium consisting of a single membrane; peridiola numerous, not attached by a funiculus to the peridium, involved in mucus.

*Nidularia*, Tul., Mon. Nid., Ann. Sci. Nat., sér. 3, vol. i. p. 100; Mass., Mon. Gast., p. 57.

Readily distinguished amongst its allies by the free peridiola.

**Nidularia pisiformis.** Tul. (fig. 6, p. 28.)

Sessile, not rooting, dirty buff, more or less hairy, tuberculose above, splitting irregularly; peridiola subrotund, biconvex, brown, smooth, shining; spores colourless, typically broadly obovate, sometimes subglobose or elliptical,  $7-8 \times 8-9 \mu$ .

*Nidularia pisiformis*, Cke., Hdbk., n. 1201; Mass., Mon. Gast., p. 58, f. 37.

On the ground, wood, leaves, &c. Sessile, springing from a broad base, more or less flattened above, about  $\frac{1}{4}$  in. across. Peridiola wrinkled when dry. Solitary or gregarious.

**Nidularia Berkeleyi.** Mass.

Subglobose, becoming broadly open, peridium thick, externally cinnamon, hairy, inside velvety, cinnamon; peridiola numerous (40–50), circular in outline, biconvex, brown, shining, about 2 mm. across; spores elliptical, smooth, becoming pale brownish-olive,  $9-10 \times 5-6 \mu$ .

*Nidularia Berkeleyi*, Mass., Mon. Gast., p. 59, f. 38.

On wood and twigs. Peridium about  $\frac{1}{4}$  in. broad and high, without a trace of cord-like rooting mycelium. Solitary



or 2-3 in groups. The peridiola are much wrinkled when dry.

**Nidularia confuens. Fr.**

Peridia subglobose, not rooting, thin, villose, whitish, becoming irregularly torn above; peridiola numerous, circular, compressed, smooth, about 1.5 mm. across; spores elliptical, smooth, colourless,  $8-10 \times 6-7 \mu$ .

*Nidularia confuens*, Fr. and Nordh., Symb. Gast., p. 3; Mass., Mon. Gast., p. 59, f. 81.

On chips and amongst leaves, rarely on the ground. About  $\frac{3}{4}$  in. across; crowded and often irregular. Peridiola wrinkled when dry.

**Nidularia dentata. With.**

Turban-shaped. Smaller than a hemp-seed; colour pale buff; rather woolly; five segments or teeth at the edge, broad, spear-shaped, regular. Membrane tough, whitish. Seeds or capsules reddish-brown.

*Nidularia dentata*, With., Arr. Brit. Pl. (ed. 3), vol. iv. p. 357.

Several growing together on rotten twigs. The above description from Withering does not agree with any recently described species, and is inserted for the purpose of preventing the creation of a new species, should the plant described above be again discovered.

**SPHAEROBOLUS. Tode. (fig. 2, p. 20.)**

Peridium consisting of two layers, splitting in a stellate manner above, the inner becoming exerted elastically, and ejecting the single peridiolum.

*Sphaerobolus*, Tode, Meckl., i. p. 43; Mass., Mon. Gast., p. 60.

Characterised by the single peridiolum. The peculiar structure of the peridium is for the purpose of effecting spore dispersion. The fungus when immature is subglobose; when mature, the two layers of the peridium split into several teeth at the top, the inner layer then contracts suddenly and becomes inverted through the toothed opening, having in the act ejected the peridiolum, with its contained spores, to some distance.

**Sphaerobolus stellatus.** Tode. (fig. 2, p. 20.)

Peridium pale yellow, or whitish, tomentose; split at the apex into several sharp teeth; peridiolum broadly elliptical; spores elliptic-oblong or obovate. Smooth, colourless,  $10 \times 5 \mu$ .

*Sphaerobolus stellatus*, Berk., Outl., p. 312, t. 21, f. 2; Cke., Hdbk. 1202, f. 145; Mass., Mon. Gast., p. 60, f. 55.

On wood, twigs, &c. Crowded, rarely solitary, at first connected by cobweb-like mycelium, about  $\frac{1}{16}$  in. across.

**THELEBOLUS.** Tode. (fig. 3, p. 20.)

Wall of peridium single, peridiolum solitary, protruding from apex of peridium.

*Thelebolus*, Tode, Meckl., i., p. 41; Mass., Mon. Gast., p. 61.

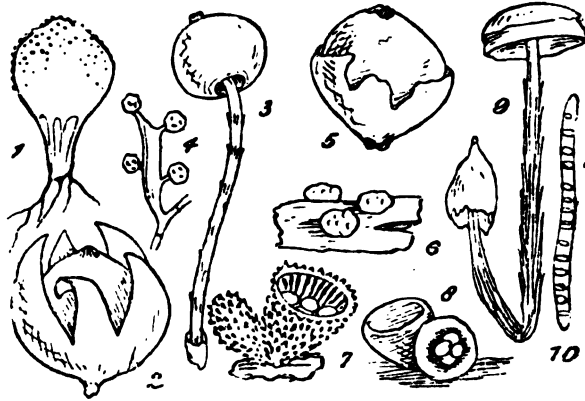
Distinguished from *Sphaerobolus* by the peridium consisting of a single layer and in the peridiolum not being ejected elastically.

**Thelebolus terrestris.** A. & S. (fig. 3, p. 20.)

Peridium sessile on a broad base, hemispherical, then urceolato-ventricose, yellow; peridiolum spherical, solitary; spores elliptic-oblong, smooth, colourless,  $10-12 \times 5-6 \mu$ .

*Thelebolus terrestris*, Alb. & Schw., Consp. Fung., p. 71, t. 11, f. 4; Cke., Hdbk., n. 1203, f. 146; Mass., Mon. Gast., p. 61, f. 57.

On wood, leaves, or on the ground. Peridia about  $\frac{1}{12}$  in. across, seated on a dense felt-like mycelium often 1-2 in. broad and long.



FIGURES ILLUSTRATING THE LYCOPERDEAE, ALSO  
THE NIDULARIEAE IN PART.

Fig. 1, *Lycoperdon pyriforme*, one-third nat. size;—Fig. 2, *Geaster hygrometricus*; the outer wall of the peridium is split into pointed teeth; half nat. size;—Fig. 3, *Tulostoma mammosum*, entire plant; nat. size;—Fig. 4, basidium of same, the four spores are borne laterally; this differs from the basidia of *Auricularia* and *Pilacre* in not being transversely septate; highly mag.;—Fig. 5, *Lycoperdon nigrescens*, showing the separate outer cortex that has broken away above, also the opening for the escape of the spores at the apex of the inner wall or endoperidium; one-third nat. size;—Fig. 6, *Nidularia pistiformis*, nat. size;—Fig. 7, *Cyathus striatus*; nat. size;—Fig. 8, *Crucibulum vulgare*; nat. size;—Fig. 9, *Battarrea phalloides*, entire plant, showing the volva at the base of the long stem; about one-quarter nat. size;—Fig. 10, a thread from the capillitium of *Battarrea*, showing annular thickenings; highly mag.

## FAM. IV.

## LYCOPERDEAE.

Peridium consisting of two layers, rarely single; spores forming a powdery mass at maturity, capillitium well developed.

*Lycoperdeae*, Mass., Mon. Gast., p. 62.

*Trichogastres*, Fries, Syst. Myc., iii. p. 3; Berk., Outl., p. 298 (in part).

The leading characteristic of the present group is the presence of numerous differentiated hyphae, constituting collectively the capillitium, mixed with the spores. In many species the *endoperidium*, or innermost layer of the peridium, dehisces by a definite *stoma* or aperture. The spores are minute, and in many species the sterigma remains attached to the spore at maturity, resembling a slender stalk. The spores are diffused by wind after their escape from the peridium.

LYCOPERDON. Tournef. (emended). (figs. 1, 5, p. 28.)

Peridium consisting of two well-defined layers, the outer spinose, warted, or smooth and separable, inner layer smooth, dehiscent by a small terminal orifice or the whole of the upper portion disappearing; sterile basal stratum present or absent: capillitium dense; spores globose or elliptical.

*Lycoperdon*, Tournef., Inst. R. Herb. 563; Berk., Outl., p. 301; Cke., Hdbk., p. 372; Mass., Mon. Gast., p. 66.

*Bovista*, Dillen., Berk., Outl., p. 301; Cke., Hdbk., p. 371; Mass., Mon. Gast., p. 62.

Judged from the standpoint of British species alone, *Lycoperdon* and *Bovista* appear to be distinct genera, the former characterised by having the outer layer of the peridium spiny or warted, whereas in the last-named the outer layer is smooth, separates from the inner, becomes fragile, and falls away in flakes; but when all the known species of both the above-named genera are examined, it is found that the above distinction does not hold good. There is an unbroken

sequence from the most spiny forms to those that are perfectly smooth, and it is impossible to draw the line between the two genera. The same remark applies to the supposed distinctions presented by the capillitium and the absence or presence of a sterile basal stratum.

As defined above, the genus *Lycoperdon* is distinguished by the spinose, warted, or smooth and deciduous outer layer of the peridium, copious capillitium, and absence of a distinctly defined opening for the escape of the spores. The various species are popularly known as puff-balls.

A. *Sterile basal stratum present.*

\* *Spores rough.*

***Lycoperdon echinatum.* Pers.**

Obovate or subglobose, bristling with crowded, long, pyramidal purple-brown spines; between which are minute brown warts; dehiscing by a small irregular opening; sterile basal stratum well developed, pale ochraceous, passing downwards into long root-like white strands; mass of spores purple-umber; capillitium dense, threads irregularly branched; spores spherical, coarsely warted, 5-6  $\mu$ .

*Lycoperdon echinatum*, Pers., Symb. Myc., p. 36; Mass., Mon. Gast., p. 67, f. 32.

On the ground in woods, amongst leaves. Generally solitary, 1-2 in. high, 1-1½ in. across, the spines are often curved and split at the base; after falling away, smooth scars are left on the wall of the peridium, each surrounded by a ring of minute warts, giving to the surface a tessellated appearance.

***Lycoperdon Hoylei.* Berk.**

Subglobose, densely covered with stout, straight or curved pyramidal, purple-brown, deciduous spines; between the spines are minute persistent brown warts; sterile base very compact, bright olive, passing into white, cord-like rooting strands; mass of spores purple amber, with olive tinge; capillitium dense, threads olive, sparsely branched; spores globose, minutely warted, 5  $\mu$ .

*Lycoperdon Hoylei*, B. & Br., Ann. Nat. Hist., n. 1037; Mass., Mon. Gast., p. 68, f. 68.

On the ground amongst leaves under trees. Peridium 1-2 in. across, superficially resembling *L. echinatum*, but distinguished by the very compact bright olive basal stratum.

***Lycoperdon atropurpureum*. Vitt.**

Subglobose or pyriform, plicate below, sessile, or the cellular, well-developed, dark-brown sterile stratum continued as a short stem-like base; peridium thin, flaccid, with slender brownish spines which soon fall away towards the apex, dehiscing by a small irregular opening at the apex; mass of spores blackish-purple; capillitium dense; spores spherical, warted, 6-7  $\mu$ .

*Lycoperdon atropurpureum*, Cke., Hdbk., n. 1085; Mass., Mon. Gast., p. 68, f. 71.

In woods, size variable, 1-2½ in. across, known from *H. echinatum* and *H. Hoylei*, by the dark-brown sterile base, slender spines, and larger spores.

***Lycoperdon excipuliforme*. Scop.**

Subglobose or depressed, sterile basal stratum continued downwards as a stout stem, plicate at the base; peridium covered with slender spinose warts that soon fall away, leaving the surface tomentose; mass of spores brownish-olive; threads of capillitium flexuous, sparingly or not at all branched; spores globose minutely warted, 4-5  $\mu$ .

*Lycoperdon excipuliforme*, Vitt., Mon. Lyc. 193; Mass., Mon. Gast., p. 69, f. 64.

In woods and meadows. From 1-4 in. high. Often closely resembling *L. saccatum* in general appearance, but distinguished by the sub-simple flexuous threads of the capillitium, and the smaller, minutely warted spores.

***Lycoperdon saccatum*. Vahl.**

Spherico-depressed, plicate below, with small spinulose warts that become smaller downwards, dehiscing by a small apical aperture; sterile base, porous, convex, passing downwards as a stout, elongated stem; mass of spores olivaceous-umber; capillitium dense, threads branched; spores globose, strongly warted, 5-6  $\mu$ .

*Lycoperdon saccatum*, Berk., Outl. 302; Cke., Hdbk., n. 1087; Mass., Mon. Gast., p. 69, f. 60.

Amongst moss in open woods, &c. From 2-5 in. high,

peridium thin, becoming smooth, usually plicate below, stem 2-4 in. high, 1 in. thick, sometimes the whole fungus is much larger than the above measurements. The stem is often irregularly lacunose.

***Lycoperdon gemmatum*. Batsch.**

Subglobose, depressed, obtuse, with large, brown pointed warts which fall away, leaving the surface smooth and shining, dehiscing by a small apical opening; sterile cellular base prominent, passing downwards into a long, thick stem tapering downwards; mass of spores olivaceous-umber; capillitium dense, threads branched; spores globose, minutely warted,  $4\ \mu$ .

*Lycoperdon gemmatum*, Mass., Mon. Gast., p. 70, f. 30.

Among grass, ferns, &c., in woods. The present species has been almost invariably confused with *L. perlatum*, from which it is distinguished by the warted spores; 3-4 in. high, 1-2 in. across. Distinguished from *L. saccatum* by the peridium not being plicate below and the smaller spores.

\* \* *Spores smooth*.

***Lycoperdon pyriforme*. Schöff. (fig. 1, p. 28.)**

Pyriform or subglobose, rather umbonate; peridium thin and flaccid, covered with minute pointed warts, becoming smooth, dehiscing by a small torn opening; furnished with numerous rooting white strands of mycelium at the base; threads of capillitium branched, springing from the cellular base and persisting as a columella-like central mass; mass of spores olive, globose, smooth, about  $4\ \mu$ .

*Lycoperdon pyriforme*, Cke., Hdbk., n. 1089; Mass., Mon. Gast., p. 71, f. 61.

On rotten wood; and on the ground attached to branches, &c. Generally densely tufted and connected by numerous white, branching roots; from 1-3 in. high, typically pyriform with a distinct umbo, sometimes subglobose.

***Var. excipuliforme*, Desm.**

Peridium contracted abruptly into a slender, equal stem.

***Lycoperdon perlatum*. Pers.**

Subglobose with an elongated stem-like base or spherico-depressed and nearly sessile, often plicate or lacunose below, always umbonate, covered with stout, short spines, each

surrounded by a ring of small persistent warts that remain after the spines have fallen away, dehiscing by a small opening; basal stratum, porous, convex; mass of spores dusky olive; threads of capillitium branched, forming a central loose columella; spores globose, smooth, 4  $\mu$ .

*Lycoperdon perlatum*, Pers., Syn. 145; Mass., Mon. Gast., p. 72, f. 31.

In woods and thickets. Often springing in pairs from the same base, 3-5 in. high, 1-2 in. across, stem often lacunose. See note under *L. gemmatum*.

***Lycoperdon molle*. Pers.**

Turbinate, base broad, abrupt, peridium thin, furfuraceous, becoming smooth, collapsing, dehiscing by a small, irregular mouth; sterile base well developed, spongy, margin well defined; mass of spores olive; capillitium dense, threads thick, walls thin collapsing; spores globose, smooth, 4  $\mu$ .

*Lycoperdon molle*, Pers., Syn. 150; Mass., Mon. Gast., p. 73, f. 65.

On the ground in woods. Very soft and yielding, dilute olive, 1½-2 in. high.

***Lycoperdon caelatum*. Bull.**

Subglobose or depressed, contracted below into a more or less elongated base, often with a long tapering root; peridium with rather large, scattered, conical warts, becoming smooth above, upper portion of peridium disappearing; mass of spores olive with a lilac tinge; capillitium dense, threads branched, disappearing; sterile base compact, rather convex; spores globose, smooth, often with a long pedicel, 4-5  $\mu$ .

*Lycoperdon caelatum*, Berk., Outl., t. 20, f. 7; Cke., Hdbk., n. 1084; Mass., Mon. Gast., p. 74, f. 58.

Fields, roadsides, woods, &c. Globose or usually depressed, 1-4 in. across; stem stout, length variable, often almost absent.

***Lycoperdon bovista*. Linn.**

Globose or depressed, often plicate at the base, sessile, whitish, peridium thick, subtomentose, becoming smooth and fragile, falling away above and leaving a wide opening; mass of spores yellow, then olive; capillitium compact;



sterile base spongy; spores globose, smooth, 4-6  $\mu$ , sometimes pedicellate.

*Lycoperdon bovista*, Linn., Sp., pl. 1653; Mass., Mon. Gast., p. 75, f. 76.

*Lycoperdon giganteum*, Hussey, vol. i. pl. 26; Berk., Eng. Fl., v. 5, p. 303; Cke., Hdbk., n. 1083.

Grassy places. Grows to a large size, varying from 4 in. to a foot or more across.

***Lycoperdon Cookei*. Mass.**

Hemispherical, flattened below and abruptly contracted into a very short, thick, stem-like abrupt base, peridium minutely areolato-furfuraceous, smoky-brown above, becoming paler below, dehiscing by a small irregular opening; cellular sterile base well developed, whitish; capillitium well developed, threads firm, unbranched; mass of spores yellow, then brownish-olive, spores globose, smooth, 4  $\mu$ , sometimes pedicellate.

*Lycoperdon Cookei*, Mass., Mon. Lycop., n. 32, pl. xiii. figs. 24-26; Mass., Mon. Gast., p. 75, f. 26.

Grassy places. From  $\frac{1}{2}$ - $\frac{3}{4}$  in. across.

**B. sterile base absent.**

**\* Spores globose.**

***Lycoperdon plumbeum*. Pers.**

Globose, outer layer of peridium thin, whitish, breaking away above, persistent below, inner layer persistent, tough, thin, lead colour, dehiscing by a small irregular opening; mass of spores umber-brown; threads of dense capillitium thick walled, thick, much branched, tapering towards the tips; spores globose, smooth, generally pedicellate, 5-6  $\mu$ .

*Lycoperdon plumbeum*, Vitt., Mon. Lyc., p. 174.

*Bovista plumbea*, Berk., Outl., p. 301, pl. 20, f. 6; Cke., Hdbk., n. 372; Mass., Mon. Gast., p. 63, f. 63.

Dry grassy and heathy places. About 1 in. across.

***Lycoperdon nigrescens*. Vitt. (fig. 5, p. 28.)**

Globose, outer layer of peridium whitish, thin, fragile, soon breaking away, inner layer tough, persistent, shining, blackish-umber, dehiscing by a small irregular opening; mass of spores umber with a decided purple tinge; threads of

capillitium thick, much branched, tapering towards the tips; spores globose, smooth, pedicellate, 5-6  $\mu$ .

*Lycoperdon nigrescens*, Vitt., Mon. Lyc., p. 176.

*Bovista nigrescens*, Berk., Outl., p. 301, t. 20, f. 5; Cke., Hdbk., p. 371; Mass., Mon. Gast., p. 63, f. 39.

Dry pastures and heathy places. From 1-2 in. across. Closely related to *L. plumbeum*, differing in being generally larger, and in having a decided purple tinge in the mass of spores.

***Lycoperdon olivaceum*. Mass.**

Globose, outer layer of peridium whitish, very thin and fugacious, inner thick, soft, white or pale ochraceous, becoming brittle and breaking away in patches above; mass of spores yellow, then olive; threads of dense capillitium thin, pale, flaccid, mostly unbranched; spores globose, smooth, sometimes pedicellate, 5  $\mu$ .

*Bovista olivacea*, Cke. and Mass., Grev. xvi. p. 77; Mass., Mon. Gast., p. 64, f. 67.

On downs. Externally resembling small forms of *L. bovista*, but there is no trace of a thickened sterile basal stratum, 1-2 in. across.

***Lycoperdon ammophilum*. Lev.**

Broadly obovate, plicate below, and passing into a long, tapering root, outer layer of peridium broken up into tomentose warts, inner layer thin, whitish, dehiscing by a small irregular opening; mass of spores olive; threads of capillitium branched, thick walled; spores globose, smooth, pedicellate, 5-6  $\mu$ .

*Bovista ammophila*, Lev., Ann. Sci. Nat., sér. 3, vol. ix. p. 129, pl. 9, f. 5; Mass., Mon. Gast., p. 64, f. 40.

On the ground in sandy places. From  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. high, remarkable for the long, tapering root.

***Lycoperdon cepaeforme*. Bull.**

Sessile, subglobose, outer layer of peridium white, papery, minutely furfuraceous, breaking away in patches, inner persistent, dehiscing by a small apical opening; root long, cord-like; mass of spores yellow with olive tinge; threads of capillitium much branched; spores smooth, globose, often with a short, thick pedicel, 4  $\mu$ .

*Lycoperdon cepaeforme*, Bull., t. 403, f. 2 (upper row).

*Bovista capaeforme*, Mass., Mon. Gast., p. 65, f. 72.

On the ground. Distinguished from *L. ammophila*, which it resembles in the long, cord-like root, in the globose peridium and smaller spores.

***Lycoperdon pusillum*. Fr.**

Subglobose, slightly attenuated at the base and continued as a long, slender, tapering root; peridium flaccid, with minute adpressed scurfy squamules, becoming smooth, dehiscing by a small opening; mass of spores olive; capillitium dense, threads much branched; spores globose, smooth, about  $\frac{1}{4}$   $\mu$ .

*Lycoperdon pusillum*, Cke., Hdbk., n. 1086; Mass., Mon. Lycop., n. 106; Bolt., t. 117, f. 6.

*Bovista pusilla*, Mass., Mon. Gast., p. 65, f. 59.

In pastures and on hedge-banks, &c. Our smallest puff ball,  $\frac{1}{4}$ – $\frac{1}{2}$  in. across.

**\*\* Spores elliptical.**

***Lycoperdon ovalisporum*. Mass.**

Subglobose, sessile; outer layer of peridium whitish, fragile above and falling away, persistent below, inner layer thin, lead-colour, dehiscing by a small opening; mass of spores umber; threads of capillitium much and irregularly branched, tips tapering; spores elliptical, umber, with a hyaline border, pedicels long, stout,  $6 \times 4$   $\mu$ .

*Bovista ovalispora*, Cke. and Mass., Grev. xvi., p. 46; Mass. Mon. Gast., p. 62, f. 62.

On the ground. Superficially resembling *L. nigrescens*, but differs in having no tinge of purple in the gleba and the elliptical spores. The last character also separates the present species from *L. plumbeum*.

**GEASTER. Micheli. (fig. 2, p. 28.)**

Peridium at first entire, composed of three layers, the two outermost (exoperidium) usually continuous, splitting from the apex into several pointed segments which become expanded; inner layer (endoperidium) sessile or pedicellate, furnished at the apex with one or more definite orifices;

columella prominent or obsolete; capillitium well developed.

*Geaster*, Mich., Nov. Pl. Gen., p. 220; Mass., Mon. Gast., p. 76.

Characterised by the exoperidium splitting into several segments which spread out in a stellate manner.

Subgen. *Myriostoma*. *Orifices and pedicels of endoperidium indefinite in number.*

***Geaster coliformis*. Pers.**

Exoperidium cut into several acute segments; endoperidium spherico-depressed, supported on several distinct pedicels; orifices several, ciliated; spores umber in the mass; threads of capillitium usually unbranched; spores globose, warted, 5-6  $\mu$ .

*Geaster coliformis*, Berk., Outl. 210; Cke., Hdbk., n. 1070; Mass., Mon. Gast., p. 77, f. 66.

In sandy places; known by the endoperidium being furnished with several orifices for the escape of the spores, and in being supported on several pedicels or stalks. Endoperidium 3-4 in. across when expanded.

Subgen. *Monostoma*. *Endoperidium with a single orifice and pedicel, or the latter may be absent.*

A. *Endoperidium distinctly pedicellate.*

***Geaster Bryantii*. Berk.**

Exoperidium cut into 8-10 acute segments, which become incurved; endoperidium subglobose, pedicellate, with a distinct groove round the top of the pedicel; peristome conical, sulcato-striate; mass of spores dark brown; threads of capillitium usually unbranched; spores globose, warted, 4-6  $\mu$ .

*Geaster Bryantii*, Berk., Outl., p. 300; Cke., Hdbk., n. 1073; Mass., Mon. Gast., p. 77, f. 56.

On the ground amongst leaves, &c. Distinguished by the groove round the top of the peduncle, and the elongated, conical, fluted peristome forming the orifice; 1½-2 in. across when expanded.

*Var. minor*, Berk.

Smaller than typical form, under 1 in. when expanded.

**Geaster Schmideli. Vitt.**

Exoperidium split to the centre into a variable number of acute segments, pale inside; endoperidium globose-ovate, pedicellate, lead-colour, peristome long, fluted, tip fimbriate; spores in the mass blackish-umber; columella distinct; spores globose, warted, 4-6  $\mu$ .

*Geaster Schmideli*, Vitt., Mon. Lyc., p. 157, t. 1, f. 7; Mass., Mon. Gast., p. 78, f. 74.

On the ground, in open places. Known amongst British species by the whitish inner surface of the exoperidium and lead-coloured endoperidium.

**Geaster Berkeleyi. Mass.**

Exoperidium thinnish, split to the centre into a variable number of acute segments; endoperidium broadly ovate, pale brown, coarsely papillose, pedicel short, thick, peristome prominent, fluted, surrounded by a smooth, depressed, silky zone; columella distinct, short; mass of spores brown; threads of capillitium simple; spores globose, warted, 4-6  $\mu$ .

*Geaster Berkeleyi*, Mass., Mon. Gast., p. 79, f. 41.

On the ground. Distinguished from *G. striatus*, to which the present species is most closely allied, in the smooth, depressed zone surrounding the peristome; 3-3½ in. across when expanded. The rays of the exoperidium become slightly incurved when dry.

**Geaster limbatus. Fr.**

Exoperidium cut into many unequal, acute segments; endoperidium subpyriform, pedicel short, stout, peristome conical, fimbriato-ciliate, surrounded by a pale, silky circle; spore-mass purple brown; columella almost obsolete; spores globose, warted, 3-5  $\mu$ .

*Geaster limbatus*, Berk., Outl., p. 300; Cke., Hdbk., n. 1074; Mass., Mon. Gast., p. 79, f. 69.

On the ground amongst leaves, &c.. Superficially resembling *G. rufescens*, distinguished by the pedicellate endoperidium.

**Geaster fornicatus. Fr.**

Exoperidium split into 4-5 subequal acute segments, the two layers separating, outer, cup-shaped, remaining attached to the ground at the base, inner becoming convex

upwards and attached to the outer by the tips of the segments only; endoperidium shortly pedicellate, obpyriform, peristome conical, ciliato-sulcate; spore-mass dark brown with purple tinge; columella slender; spores globose, warted, 3-5  $\mu$ .

*Geaster fornicatus*, Berk., Outl., p. 299; Cke., Hdbk., n. 1071; Mass., Mon. Gast., p. 80, f. 42.

On the ground amongst leaves, &c. Distinguished by the inner layer of the exoperidium becoming arched and attached to the outer layer by the tips of the rays only. Very variable in size.

B. *Endoperidium sessile or subsessile.*

*Geaster striatus*. D.C.

Exoperidium split into a variable number of thin, coriaceous, acute segments; endoperidium subsessile, globose, usually minutely rough with projecting points, peristome prominent, conical, fluted; spore-mass umber brown; spores globose, warted, 4-5.5  $\mu$ .

*Geaster striatus*, Berk., Outl., p. 300; Cke., Hdbk., n. 1072; Mass., Mon. Gast., p. 85, f. 28.

On the ground. Distinguished by the absence of a pale silky ring round the peristome from *G. limbatus*. Measuring 1½-2½ in. when expanded.

*Geaster Michelianus*. W. G. Sm.

Exoperidium thick, often cracked outside, splitting to the middle into 4-6 acute segments, inner layer thick, crumbling away; endoperidium subsessile ovate, peristome plano-conical, ciliato-fimbriate, pale; spore-mass brownish umber; columella large, clavate; spores globose, warted, 4-5  $\mu$ .

*Geaster Michelianus*, W. G. Smith, Gard. Chron. (1873), n. 18; Mass., Mon. Gast., p. 84, f. 27.

*Geaster lageniformis*, Cke., Hdbk., n. 1079, fig. 113; Grev. ii. p. 35, pl. 13.

On the ground. The young plant is ovate-acuminate before the splitting of the endoperidium. Distinguished by the thick, rigid endoperidium, and the large club-shaped columella; 2-3 in. across when expanded.

*Geaster lageniformis*. Vitt.

Exoperidium ovate-acuminate, splitting into a variable

number of acute segments, inner stratum disappearing; endoperidium subglobose, sessile, peristome plano-conic, silky, striate, surrounded by a silky zone; spore-mass umber with olive tinge; columella clavate; spores globose, very minutely warted, 3-4  $\mu$ .

*Geaster lageniformis*, Vitt., Mon. Lyc., p. 160, t. i. f. 2; Mass., Mon. Gast., p. 84, f. 75.

On the ground. Superficially resembling *G. Michelianus*, but at once distinguished by the silky zone surrounding the peristome, sessile endoperidium, and smaller spores.

***Geaster mammosus*. Chev.**

Exoperidium split nearly to the base into a varying number of acute segments; endoperidium sessile, pale; peristome conical, acute, fimbriato-ciliate, surrounded by a pale, narrow, silky circle; spore-mass dark brown with purple tinge; columella short; spores globose, warted, 4-6  $\mu$ .

*Geaster mammosus*, Berk., Outl. 300; Cke., Hdbk., n. 1076; Mass., Mon. Gast., 81, f. 78.

*Lycoperdon recolligens*, Sow., Fungi, t. 401.

On the ground. Exoperidium hygrometric, the segments being much incurved when dry; 1-2 in. across when expanded. Somewhat resembles *G. hygrometricus*, but distinct in the presence of a columella and prominent peristome surrounded by a pale, silky ring.

***Geaster rufescens*. Pers.**

Exoperidium rigid, thick, split nearly to the base into a variable number of acute segments which become revolute; endoperidium sessile, subovate, pale, peristome dentate; spore-mass blackish brown; spores globose, warted, 3-5  $\mu$ .

*Geaster rufescens*, Berk., Outl., p. 300; Cke., Hdbk., n. 1077; Mass., Mon. Gast., p. 82, f. 79.

In pastures and woods. From 2-4 in. across when expanded, resembling most closely *G. fimbriatus*, but distinguished by the peristome being surrounded by sub-triangular, pointed teeth, and in the segments of the thick exoperidium being revolute when dry.

***Geaster fimbriatus*. Fr.**

Exoperidium flaccid, split into a variable number of acute segments, inner layer soon disappearing; endoperidium

subglobose, sessile, peristome indeterminate, piloso-fimbriate; spore-mass blackish umber; spores globose, minutely warted, 3-4  $\mu$ .

*Geaster fimbriatus*, Berk., Outl., p. 300, pl. 20, f. 4 (peristome not correctly represented); Cke., Hdbk., n. 1075; Mass., Mon. Gast., p. 81, f. 77.

On the ground. From 1-2 in. across when expanded. The number of segments into which the endoperidium splits varies from 5-15 in different individuals, and these remain spread out almost flat.

*Geaster hygrometricus*. Pers. (fig. 2, p. 28.)

Exoperidium split into a varying number of acute lobes, which are rigidly inflexed when dry; endoperidium sessile, usually depressed, subreticulate, rarely smooth, dehiscing by an irregular, small apical mouth; spore-mass dark brown; columella obsolete; spores globose, warted, 7-10  $\mu$ .

*Geaster hygrometricus*, Cke., Hdbk., n. 1078; Mass., Mon. Gast., p. 83, f. 70.

On the ground. Exoperidium hygroscopic, segments rigidly incurved when dry, 2-3½ in. across when expanded. Opening of endoperidium irregular, without a defined peristome; in this respect resembling some species of *Lycoperdon*. Distinguished from *G. fimbriatus*, where the mouth is also indeterminate, in the incurved segments and the much larger spores.

TULOSTOMA. Pers. (emended). (figs. 3, 4, p. 28.)

Peridium consisting of two layers, the outer deciduous, inner persistent, dehiscing by a small apical opening, columella absent; capillitium present, threads septate, swollen at the septa.

*Tulostoma*, Pers., Disp., p. 6; Mass., Mon. Gast., p. 85.

Resembling a *Lycoperdon* with a long slender stem, distinguished by a groove between the apex of the stem and the septate threads of the capillitium.

*Tulostoma mammosum*. Fr. (figs. 3, 4, p. 28.)

Peridium subglobose, smooth, mouth small, prominent, entire; stem thin, equal, more or less squamulose; spore-mass dirty cinnamon; threads of capillitium colourless, thick-



walled, septate, slightly thickened at the septa; spores globose, minutely warted,  $5\ \mu$ .

*Tulostoma mammosum*, Berk., Outl. 299; Cke., Hdbk., n. 1069, f. 112; Mass., Mon. Gast., p. 86, f. 33.

*Tulostoma brumale*, D.C., Fl. Fr. ii. p. 269.

On old walls, dry banks, &c. From 1-3 in. high; peridium  $\frac{1}{2}$ - $\frac{3}{4}$  in. across, furnished with a minute umbo at the apex, which eventually forms the mouth through which the spores escape; stem equal, about two lines thick, smooth, or generally furnished with minute recurved scales that are sometimes arranged in circles like frills. Whitish when fresh, becoming dirty ochraceous when dry.

#### BATTARREA. Pers. (figs. 9, 10, p. 28.)

Volva universal, central layer gelatinous. Peridium very much depressed, bursting through the volva and raised above ground on a long stem; capillitium present; columella absent.

*Battarrea*, Pers., Syn. Fung., p. 129; Mass., Mon. Gast., p. 86.

The very much depressed peridium, which is concavo-convex in section, with the convex side uppermost, distinguishes the present genus.

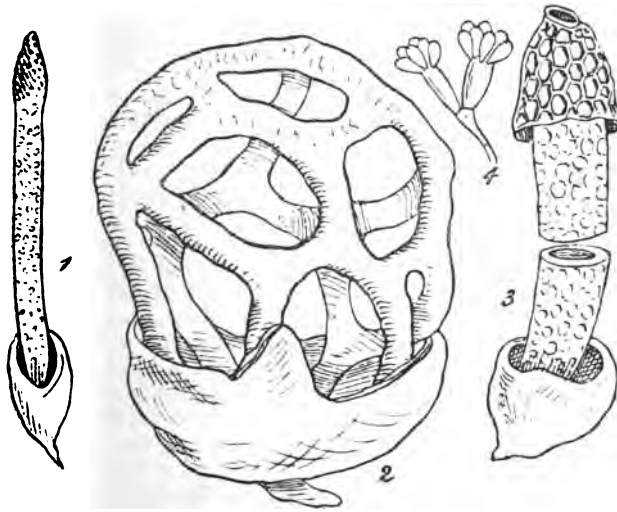
#### *Battarrea phalloides*. Pers. (figs. 9, 10, p. 28.)

Stem elongated, slightly tapering downwards, hollow, externally broken up into coarse fibres; furnished with a loose volva at the base; mass of spores yellowish brown; capillitium threads branched, collapsing, mixed with a few thicker threads having the wall thickened in a spiral manner; spores globose, minutely warted,  $6\ \mu$ .

*Battarrea phalloides*, Berk., Outl., p. 299; Cke., Hdbk., n. 1068, f. 111; Mass., Mon. Gast., p. 87, f. 29.

*Lycoperdon phalloides*, Sow., Fung., t. 390.

Sandy places and in hollow trees at the base. The plant is at first buried deep in the sand, and enclosed in a volva as in *Phallus*. After the complete differentiation of the gleba, the peridium is elevated above ground on a long stem from 10-14 in. long and  $\frac{1}{2}$ - $\frac{3}{4}$  in. thick in the centre. If the fungus is drawn up by the stem, the volva generally remains behind. Peridium 1-1 $\frac{1}{2}$  in. across.



FIGURES ILLUSTRATING THE PHALLOIDEAE.

Fig. 1.—*Mutinus caninus*, entire plant, showing volva at base; half nat. size;—Fig. 2, *Clathrus cancellatus*, showing split volva at base and cancellate receptacle; half nat. size;—Fig. 3, *Ithyphallus impudicus*, showing torn volva at base, long, hollow receptacle supporting the free pileus at its apex; one-quarter natural size;—Fig. 4, *Clathrus cancellatus*, basidia bearing six to eight spores each; highly mag.

*FAM. V.***PHALLOIDEAE.**

Receptacle and gleba at first enclosed in a universal volva composed of three distinct layers, the central one being gelatinous at maturity; spores minute, elliptic-oblong, smooth, when mature involved in mucus.

*Phalloideae*, Fr., Syst. Myc. ii. p. 281; Mass., Mon. Gast., p. 87.

Complete differentiation of the various parts up to the spore formation takes place underground, and while yet enclosed in the white, sub-elastic volva. When the spores are mature and involved in the green mucus resulting from the disintegration of the elements of the hymenium, the volva is ruptured by the rapid expansion of the receptacle, which elevates into the air the mucus containing the spores.

**ITHYPHALLUS.** Fischer. (fig. 3, p. 43.)

Receptacle elongated, hollow, cellular, perforate at the apex; pileus reticulated, attached only to the apex of the receptacle.

*Ithyphallus*, Fischer, Ueber die Phalloideen, p. 41, Mass., Mon. Gast., p. 87.

*Phallus*, Mich., Gen., p. 201.

Distinguished by the pileus being attached only to the perforated margin of the receptacle.

**Ithyphallus impudicus.** Fisch. (fig. 3, p. 43.)

Receptacle elongato-fusiform, colourless; pileus reticulated externally; spores immersed in an olive-green, very strong-smelling gluten; spores cylindrical,  $3-5 \times 2 \mu$ .

*Ithyphallus impudicus*, Fischer, Ueb. die Phalloid., Mass., Mon. Gast., p. 88, f. 44.

*Phallus impudicus*, Grev., Scot. Cr. Fl., t. 213; Berk., Outl. 297, t. 20, f. 3; Cke., Hdbk., n. 364, f. 108.

*Phallus iosmos*, Berk., Eng. Fl. v. p. 227.

On the ground in woods, &c. The fungus frequently attains the size of a hen's egg before bursting through the

volva, and is then white, soft and elastic to the touch. When fully developed varies from 5-7 in. high, and readily detected at a distance of several yards by its abominable smell. There is a wide-spreading, white cord-like mycelium underground, from which several individuals generally spring.

**MUTINUS.** Fr. (fig. 1, p. 43.)

Receptacle elongated, hollow, wall with a single row of cavities, apex closed or perforated; pileus apical, not free from the receptacle.

*Mutinus*, Fries, Summ. Veg. Scand. ii. 1849; Mass., Mon. Gast., p. 89.

*Cynophallus*, Berk., Outl., p. 298. Distinguished from *Ithyphallus* by the pileus being adnate to the receptacle.

**Mutinus caninus.** Fr. (fig. 1, p. 43.)

Receptacle elongato-fusiform, cellular, white or rosy; pileus short, subacute, rugulose, red; spores cylindrical, involved in green mucus,  $3-5 \times 2 \mu$ .

*Mutinus caninus*, Fries; Mass., Mon. Gast., p. 89, f. 43.

*Phallus* (*Cynophallus*) *caninus*, Berk., Outl., p. 298; Cke., Hdbk., p. 365, f. 109.

*Phallus inodorus*, Sow., Fung., t. 330.

In woods and bushy places. Sporophore from  $\frac{1}{2}$ — $\frac{3}{4}$  in. before the volva is ruptured. When fully evolved 3-4 in. high. Sometimes scentless, at others with a distinct odour, but never so strong and disagreeable as in *Ithyphallus impudicus*.

**Mutinus bambusinus.** Fischer.

Receptacle elongato-fusiform, the upper half occupied by the red adnate pileus; spores cylindrical,  $4 \times 1.5 \mu$ , involved in green mucus; very foetid.

*Mutinus bambusinus*, Fischer, Ann. du Jardin Bot. de Buitenzorg, vol. vi. p. 30, t. iv. figs. 26-31; Mass., Mon. Gast., p. 89.

An East Indian species, probably introduced with plants from Java.

Somewhat resembling *M. caninus*, but distinguished by the much longer pileus, which covers the upper half of the

receptacle, and by the foetid smell, which is even worse than in *Ithyphallus impudicus*.

**CLATHRUS.** Mich. (figs. 2 and 4, p. 43.)

Volva universal, becoming torn into irregular lobes at the apex; receptacle forming an obovate or globose, hollow network, walls cellular, covered with mucus containing the spores.

*Clathrus*, Micheli, Gen. Pl., p. 214; Mass., Mon. Gast., p. 90.

Distinguished by the peculiar receptacle, which consists of a hollow sphere bounded by thick, cellular, anastomosing branches.

**Clathrus cancellatus.** Tournef. (figs. 2 and 4, p. 43.)

Receptacle obovate or subglobose, vermilion or dingy red, at first covered with olive mucus containing the cylindrical spores,  $3-5 \times 2 \mu$ ; extremely foetid.

*Clathrus cancellatus*, Berk., Outl. 298; Cke., Hdbk., n. 1067; Mass., Mon. Gast., p. 90, f. 46.

In woods. A very beautiful but extremely foetid fungus, receptacle from 2-4 in. across.

[**ASEROE.** La Bill.

Receptacle stipitate, expanded at the apex into a disc, from the margin of which radiate several tapering, straight or curved rays; spores contained in mucus situated on the disc.

**Aseroe rubra.** La Bill.

Stem red or pale rose, apex, perforated disc and bifid rays bright red.

An Australian species introduced at Kew along with plants.

The whole fungus resembles a red sea-anemone.]

*Genera excluded.*

**Polyangium.**—An insect production.

**Cenococcum.**—Belongs to the *Tuberaceae*.

**PILACREAE.**

The present group, established by Brefeld, is in every respect anomalous, and in reality appears to occupy a transitional position between the *Gastromycetes* and the *Hymenomycetes*. The single genus, *Pilacre*, consists of minute fungi rarely exceeding half an inch in height, and resembles a long-stalked puffball, or rather a *Tulostoma* in miniature, consisting of a more or less globose head supported on a slender stem. The stem is continued into the head or gleba as a compact, subglobose columella, from which spring a large number of hyphae that produce clusters of basidia. These basidia agree with those met with in the sub-Family *Auricularieae* of the *Tremellineae* in being cylindrical and transversely septate; this feature is considered by Brefeld as indicating an affinity with the *Tremellineae*, from which the species differ widely in every other particular. The mass of basidia-producing hyphae, along with others that are sterile, are at first enclosed in an outer web of hyphae that may be compared with the peridium in the *Gastromycetes*; in fact, the reproductive portion is at first concealed in a peridium that eventually disintegrates, a character that suggests affinity with the *Gastromycetes*. Nevertheless, the above account shows that the group under consideration is not typical of either of the above-named groups, hence its present intermediate position.

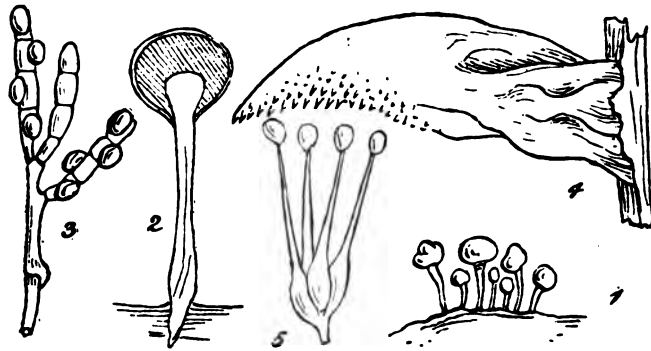
In Saccardo's *Sylloge* the genus is placed in the *Hyphomycetes*; this, however, is the outcome of mere superficial resemblance, and directly opposed to all morphological characters.

**PILACRE.** Fries. (figs. 1, 2, 3, p. 48.) (emended).

Peridium subglobose, stipitate, wall single, fibrillose, at length evanescent; stem continued into the gleba as a columella, from which originate numerous hyphae that produce lateral branches terminating in 1-4 transversely septate, cylindrical basidia, and usually terminate in sterile, spirally twisted branchlets; spores coloured, circular in outline,

umbilicate, sessile, produced laterally, one on each of the cells of a basidium.

*Pilacre*, Fries, Syst. Orb. Veg. 1, p. 364; Brefeld, Unters. vii. Heft., p. 27.



FIGURES ILLUSTRATING THE *PILACREAE*, ALSO THE *TREMELLINEAE* IN PART.

Fig. 1, *Pilacre Petersii*, natural size;—Fig. 2, section of same, mag.;—Fig. 3, cluster of transversely septate basidia of same, bearing lateral spores; highly mag.;—Fig. 4, *Tremellodon gelatinosum*, a small specimen; nat. size;—Fig. 5, basidium of same, with the four long, stout sterigmata bearing spores; highly mag.

***Pilacre faginea*. B. & Br.**

Gregarious, up to  $\frac{1}{4}$  in. high, head about  $1\frac{1}{2}$  lines across, whitish with a brown tinge; stem blackish; threads of gleba tortuous, spores subglobose, yellow-brown,  $5\ \mu$ .

*Pilacre faginea*, B. and Br., Ann. Nat. Hist., n. 380, t. xi. fig. 5; Sacc. Syll. 4, n. 2748.

On rotten beech-wood.

***Pilacre Petersii*. B. & C. (figs. 1, 2, 3, p. 48.)**

Stem 2-3 lines high, whitish, head 2-3 lines across; spores circular and sub-umbilicate, brown,  $5\ \mu$  diameter.

*Pilacre Petersii*, Berk. and Curt., Ann. Nat. Hist., n. 824; Sacc. Syll. 4, n. 2572.

On trunks of hornbeam, holly, beech, &c. Gregarious, often covering half-dead trunks for a considerable distance.

### HYMENOMYCETES.

In tracing the evolution of the sporophore from the most primitive, entirely resupinate forms, I have repeated what I previously wrote on this subject.\*

"Every type of hymenophore known in the Hymenomyces is met with in such genera as *Stereum* and *Thelephora*, and in some instances even in the same species.

The following are the most marked phases of sporophore evolution as occurring in the Hymenomyces, illustrated by *Stereum hirsutum*, Fries, one of the Thelephoreae:—

(a) The most primitive type is where the sporophore is spread out as a thin layer attached to the substratum by the whole of the under surface, the upper surface being covered with the hymenium. In many of the simpler Thelephoreae this mode of growth is permanent; but in species like *Stereum hirsutum*, which may be described as inclined to 'sport,' or, more correctly, where *epinasty*, the cause of the (a) type of sporophore, is strongly manifested, the above mode of growth occurs when developing on a broad horizontal substratum.

(b) When the substratum is vertical, which may be the side of a prostrate trunk, or an erect one, growth commences as in type (a), and after extending from a centre for some time, and assuming a more or less circular outline, the uppermost margin becomes free, and continues to grow away from the substratum, and at right angles to the attached portion. In this type we get the first transition from the superior to the inferior hymenium imperfectly indicated; and it is interesting to remember that the first step towards the inversion of the hymenium—itsself the most pronounced result of

\* 'A Monograph of the Thelephoreae.' Part I., Linn. Soc. Journ. Botany, vol. xxv. p. 107 (3 pl.).



development in the sub-group—is not the outcome of a new initial force, but simply the continuation of epinasty, which kept type (a) all pressed to the horizontal substratum. When growing in what may be termed an unnatural position, the dominant directive force, epinasty, directs the plant along the old hereditary lines, and as soon as possible the horizontal position is resumed with the free margin incurved. To prove that this change of direction of growth is due to the position of the substratum, it is only necessary to place a prostrate branch with the plant growing on it, as in the (a) type, in a vertical position, when further development will follow (b) type; and microscopic examination will clearly reveal the epinastic curvatures of the hyphae in the thallus, as in the section of *Stereum hirsutum* given by De Bary.\* The above is a remarkable illustration of a new type of structure due entirely to surroundings. (c) In type (b) three-fourths or more of the plant is usually attached to the substratum, and this is more especially the case when growing on the side of a prostrate trunk or large branch, where the side presents, compared to the size of the plant, a practically flat vertical surface, which appears in some way to neutralise, to a great extent, the epinasty of the plant; whereas, when growing on the side of a small prostrate branch, when the antagonistic flat surface is reduced to a minimum, the plant often becomes free soon after the commencement of growth, the upper, free horizontal portion still continuing to develop in a more or less circular manner, which results in a structure that can be understood by comparing it to a reniform leaf attached by a short, flat petiole to the branch, the lamina being free, more or less depressed in the centre, and incurved at the margin. This stage illustrates the origin of a central stem and umbrella-shaped pileus, which is perfected in (d) by the two lateral lobes becoming united behind, which results from the plant growing from a point where it is free to expand equally on every side from a short stem-like base.

Passing to the highest order of the Hymenomycetes, the Agaricineae, we meet with the same sequence of sporophore development. In the genus *Pleurotus*, such simple, stemless forms as *P. applicatus*, Batsch, illustrate the (a) type, being

\* 'Fungi, Bacteria and Mycetozoa.' Engl. Ed., p. 53, fig. 23.

attached to the substratum by the barren surface, with the hymenium uppermost.

*P. hypnophilus*, Berk., and *P. chioneus*, Pers., follow the (b) type; *P. ostreatus*, Fr., the various stages of (c) to the highest condition of (d). Here again, within the range of a single genus, we have a repetition of what has already been described as occurring in the Thelephoreae, and also the result of similar external influences, modifying in various ways the inherent epinastic tendency.

The character of primary importance in distinguishing the orders of the Hymenomycetes consists in the arrangement of the hymenium or spore-bearing surface, which may be briefly described as follows:—Agaricineae: hymenium spread over radiating plates or gills. Polyporeae: hymenium lining variously shaped pores or depressions. Hydneae: hymenium covering spine-like or granular projections. Clavarieae: hymenium continuously covering the greater portion of the clavate or variously branched hymenophore. In the Thelephoreae we find clearly indicated all the above types of hymenium."

The Tremellineae, although evidently allied to the Hymenomycetes in the presence of basidia, exhibit none of the characteristic sequences of development indicated above, but, as first pointed out by De Bary, connect the true Hymenomycetes with the tremelloid Uredines, which are shown by the same author to belong to the Ascomycetes. Hence we must consider the Basidiomycetes as being derived from the Ascomycetes through the Tremellineae as a connecting-link. For a fuller explanation of this subject relating to the evolution of the Basidiomycetes along the lines indicated, the reader is referred to the 'Monograph of the Thelephoreae' already alluded to.

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**HYMENOMYCETES.**

Fungi membranaceous, fleshy, corky, or woody, usually large; growing on the ground or on wood, hymenium distinct and continuous, exposed from the first or at an early stage of development; basidia usually tetrasporous; cystidia often present; spores septate or more frequently continuous, colourless or coloured, epispore smooth or verruculose.

**ANALYSIS OF THE FAMILIES.**

\* *Substance gelatinous.*

*Fam. I. TREMELLINAE.*

\*\* *Substance not gelatinous.*

† *Hymenium even.*

*Fam. II. CLAVARIEAE.*

Sporophore erect, clavate, branched, or foliose, entirely covered by the hymenium.

*Fam. III. THELEPHOREAE.*

Sporophore resupinate or effuso-reflexed; hymenium unilateral.

†† *Hymenium not even.*

*Fam. IV. HYDNEAE.*

Hymenium spinulose or covered with protuberances or granules.

*Fam. V. POLYPOREAE.*

Hymenium porous or tubular.

*Fam. VI. AGARICINAE.*

Hymenium spread over radiating gills or lamellae.

## FAM. I.

## TREMELLINEAE. Fries.

Entire fungus homogeneous, gelatinous, collapsing when dry, regaining its form when moistened, traversed internally by branched hyphae which terminate in basidia at the periphery; basidia variable in form, elongate or fusoid, transversely septate or continuous, undivided or with the apex forked, or subglobose and cruciately divided and bearing two or four sterigmata; spores hyaline, from globose to sausage-shaped and curved, continuous or septate, often becoming variously septate on germination and producing sporidiola of various forms.

*Tremellineae*, Fries, Syst. Myc. I., p. 2; Sacc. Syll. vi. p. 760.

The Tremellineae are characterised by their more or less gelatinous consistency. In *Tremella*, the central genus, the substance is in some species so tender as to lose its form and almost deliquesce on being handled, whereas in *Auricularia* the texture is coriaceous and retains its form. This peculiarity is due to the fact that the external portion of the walls of the intricately interwoven hyphae are diffuent, forming a quaking jelly when moist, hard and horny when dry, becoming soft again when moistened. In the lower forms, as *Tremella*, *Dacryomyces*, &c., the hymenium covers every portion of the exposed surface, whereas in the higher types, as *Auricularia*, *Guepinia*, &c., the hymenium is confined to one surface of the sporophore, and in most instances this surface has a more or less marked tendency to point downwards or away from the light.

Being at the base or starting-point of the Basidiomycetes, the basidia, which constitute the principal feature of the group, are what may be termed in an unstable condition, not having in any member of the present family assumed the structure so constant within narrow limits and characteristic of the following families. In *Auricularia* the basidia are very primitive and transversely septate, each joint or cell of the basidium producing near or at its apex a single

sterigma. A second type occurs in *Dacryomyces* and *Guepinia*, where the basidium is more or less cylindrical and bifurcate at the apex, each branch terminating in a sterigma that bears a spore. A third type occurs in *Tremella*, where the basidium at first appears as a subglobose or pear-shaped body terminating a hypha; this body is early divided into four portions at its apex by two septa that cross at right angles, then each of the four divisions grows out into a long sterigma that eventually bears a spore. In the two last-named types the basidia are not transversely septate. The spores are always *hyaline* or colourless, and the present family is the only one included in the Basidiomycetes where some of the species have septate spores. The spores on germination produce in many species characteristic secondary spores or *sporidiola*. Brefeld has recently rearranged the genera, based on the form and arrangement of the sporidiola to a great extent; time will prove whether this one character is of more value than the sum of characters previously considered in the natural delimitation of genera. Brefeld has also shown that conidia are not uncommon in various members of the family; in *Tremella lutescens* these are produced on corymbose branches in the substance of the sporophore, while in *Guepinia* they are produced on the side opposite to the hymenium.

Microscopic examination is best effected after the specimens have been hardened in alcohol or good methylated spirit, when satisfactory sections can be cut, which is not possible with the fresh gelatinous material.

*Sub-Fam. I. AURICULARIEAE.*

Basidia elongated or fusoid, simple, transversely septate.

*Sub-Fam. II. TREMELLINEAE.*

Basidia subglobose, at maturity longitudinally quadripartite in a cruciate manner, and producing at the apex two, or usually four, elongated sterigmata.

*Sub-Fam. III. DACRYOMYCETAE.*

Basidia cylindrical or clavate, divided at the apex into two long sterigmata, not septate.

*ANALYSIS OF THE GENERA.*

## AURICULARIEAE.

**Auricularia.**—Broadly attached, margin free and reflexed.

**Hirneola.**—Cartilaginous, ear-shaped, attached by a point.

## TREMELLINEAE.

**Exidia.**—Cup-shaped, truncate, or irregularly lobed; spores reniform, producing curved sporidiola on germination.

**Ulocolla.**—Pulvinate and gyrose; spores reniform, producing rod-shaped sporidiola on germination.

**Tremella.**—Brain-like or lobed; spores globose or ovoid.

**Naematelia.**—Firm, convex, with a central, hard nucleus.

**Gyrocephalus.**—Erect, spathulate.

**Tremellodon.**—Gelatinous, tremelloid, fan-shaped, fleshy; hymenium with distinct spines.

## DACRYOMYCETAE.

**Dacryomyces.**—Small, pulvinate and gyrose.

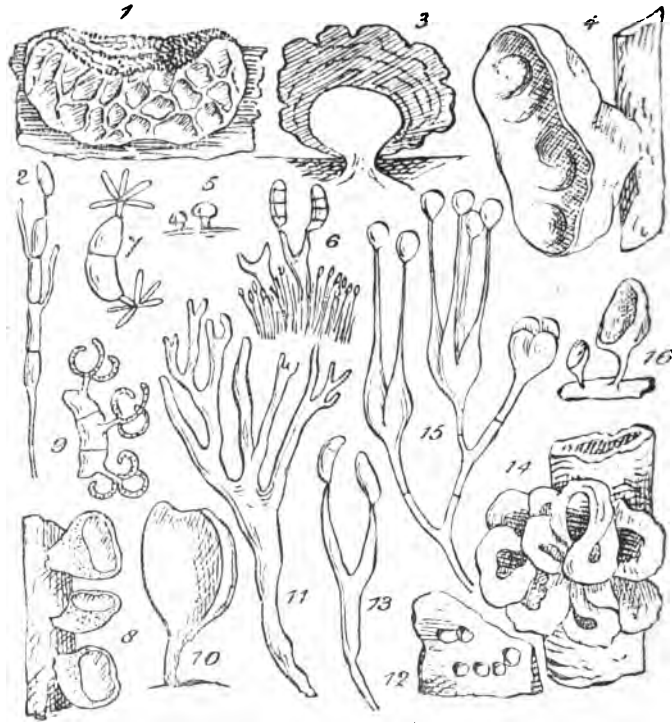
**Guepinia.**—Irregularly cup-shaped, hymenium on one surface only.

**Dacryopsis.**—Hymenium at the apex of a short stem, bearing conidia and spores.

**Ditiola.**—Stem distinct, bearing the hymenium at its expanded apex.

**Apyrenium.**—Subglobose or lobed, hollow.

**Calocera.**—Subcylindrical and erect, simple or branched.



## FIGURES ILLUSTRATING THE TREMELLINEAE.

Fig. 1, *Auricularia mesenterica*, a small specimen; nat. size;—Fig. 2, basidium and spore of same; highly mag.—Fig. 3, *Naematelia encephala*, section of, showing the central nucleus; nat. size;—Fig. 4, *Hirneola auricula-judae*, small specimen; nat. size;—Fig. 5, *Dacryopsis nuda*; nat. size;—Fig. 6, portion of head of same, showing the densely fasciculate conidiophores with conidia, also basidia bearing three septate basidia spores; highly mag.;—Fig. 7, *Ulocolla saccharina*, spore germinating and producing straight, rod-like sporidiola; highly mag.;—Fig. 8, *Evidia recta*, small specimens; nat. size;—Fig. 9, *Evidia glandulosa*, spore germinating and producing curved sporidiola; highly mag.;—Fig. 10, *Gyrocephalus rufus*; nat. size;—Fig. 11, *Calcetra viscosa*; nat. size;—

## AURICULARIEAE.

AURICULARIA. Bull. (emended). (figs. 1, 2, p. 56.)

Hymenium inferior, remotely and vaguely costate or plicate, inflated and gelatinous when moist, collapsing when dry. Basidia cylindrical, 3-5 septate, each joint or cell producing a single slender sterigma from its apical region. Spores oblong, curved, producing on germination a branched promycelium, bearing several strongly curved sporidiola. Habit exactly that of *Stereum*, but fructification entirely distinct.

*Auricularia*, Bull., Champ., p. 277; Sacc. Syll. vi. p. 762.

*Auricularia mesenterica*. Fries. (figs. 1 and 2, p. 56.)

Pilei resupinate, reflexed above, velvety, zoned, greyish-brown, margin not lobed; hymenium brownish-violet, spores oblong, reniform,  $18-20 \times 7 \mu$ .

*Auricularia mesenterica*, Fries, Epicr., p. 555; Cke., Hdbk., p. 319.

On trunks. Often very broadly effused and with numerous partly free imbricated pilei.

*Auricularia lobata*. Sommerf.

Pileus effuso-reflexed, margin lobed, surface velvety, zoned, whitish-brown; hymenium livid fulvescent, spores as in *A. mesenterica*.

*Auricularia lobata*, Sommerfeldt, Mag. Nat. Vidensk., 1827; Cke., Hdbk., p. 320.

On bark of trees. Closely allied to *A. mesenterica*, from which it is mainly separated by the lobed margin of the pileus.

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Fig. 12, *Dacryomyces stillatus*; nat. size;—Fig. 13, *Dacryomyces chrysocoma*, bifurcate basidium and spores; highly mag.;—Fig. 14, *Tremella mesenterica*; nat. size of a small specimen;—Fig. 15, *Tremella lutescens*, showing the basidia in various stages of development, the sterigmata vary from two to four; highly mag.;—Fig. 16, *Guepinia peziza*; nat. size.



**HIRNEOLA.** Fr. (emended). (fig. 4, p. 56.)

Cartilagineo-gelatinous, soft and tremelloid when moist. Sporophore cup-shaped, rigid when dry, reviving when moistened, but not becoming inflated. Basidia rod-shaped or fusoid, transversely septate, cells each bearing a single monosporous sterigma; spores oblong, curved.

*Hirneola*, Fries, Fung. Natal, p. 24; Sacc. Syll. vi. p. 764.

In the British species the hymenium is variously plicate, the pileus or barren surface minutely velvety.

***Hirneola auricula-judae*.** Berk. (fig. 4, p. 56.)

Thin and elastic when moist, becoming blackish or dark-brown; hymenium venoso-plicate; spores reniform,  $20-25 \times 7-9 \mu$ ; pileus greyish-olive, minutely tomentose.

*Hirneola auricula-judae*, Berk., Outl., p. 289, t. 18, f. 7; Cke., Hdbk., p. 349.

On elder and elm. From 1-3 inches broad.

[*Hirneola polytricha*, Mont. Has occurred on imported timber, but is not a British species.]

**TREMELLINEAE.****EXIDIA.** Fr. (emended). (figs. 8, 9, p. 56.)

Gelatinously distended, tremelloid, submarginate or effused, often papillose; basidia globose or ovoid, typically longitudinally cruciately divided, bearing four elongated, stout sterigmata; spores reniform, for a long time continuous, becoming 1-many septate on germination, each cell or loculus of the spore giving origin to a very short promycelium bearing a crown of strongly curved sporidiola.

*Exidia*, Fries, Syst. Myc. ii. p. 220; Sacc. Syll. vi. p. 772.

***Exidia glandulosa*.** Fries. (fig. 9, p. 56.)

Flattened, thick, gelatinous, becoming blackish; disc covered with minute papillae; below greyish and sub-tomentose; spores reniform,  $12-14 \times 4-5 \mu$ .

*Exidia glandulosa*, Fries, Syst. Myc. ii. p. 224; Cke., Hdbk., p. 349.

On dead branches of oak, &c. Varying from grey to brown, at length black; often wrinkled above and plicate below,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. across.

*Exidia recisa*. Fries. (fig. 8, p. 56.)

Soft and gelatinous, hymenium plane, often wavy, amber-brown, tapering downwards to a narrow, usually excentric point of attachment, scabrous below; spores oblong, 13–20  $\times$  5–7  $\mu$ .

*Exidia recisa*, Fries, Syst. Myc. ii. p. 223; Cke., Hdbk., p. 348.

On dead branches of willow, reaching to 1 inch in diameter.

*Exidia albida*. Brefeld.

Gelatinous, expanded, undulate, white, becoming brownish with age and pruinose with the white spores; spores oblong, curved, 12–14  $\times$  4–6  $\mu$ .

*Exidia albida*, Brefeld.

*Tremella albida*, Cke., Hdbk., p. 346.

On dead branches. Bursting through cracks in the bark and forming waved, subgyrose, white, semipellucid folds that become yellowish or brown with age. Up to 1 inch across.

ULOCOLLA. Bref. (fig. 7, p. 56.)

Sporophore convex, pulvinate, gyrose, cerebriform, gelatinous, rather large; basidia globose, soon longitudinally or obliquely cruciately partite; sterigmata, elongated, thick; spores for a long time continuous, then 1-septate, reniform, each loculus on germination giving origin to a very short promycelium bearing at its apex a crown of straight, rod-like sporidiola.

*Ulocolla*, Brefeld, Untersuch. vii. p. 95; Sacc. Syll. vi. p. 777.

*Ulocolla saccharina*. Bref. (fig. 7, p. 56.)

Tuberculose, effused, thick, gyrose and undulate, fulvous-cinnamon, here and there papillose; spores reniform, 10–12  $\times$  5–6  $\mu$ ; conidia about equal to the spores.

*Ulocolla saccharina*, Brefeld.

*Exidia saccharina*, Cke., Hdbk., p. 349.

On fallen pine-trunks. The colour of crystallized sugar when young, afterwards with a fulvous tinge.

*Ulocolla foliacea*. Bref.

Tufted and much lobed and waved, segments thin, springing from a plicate base; colour variable, diaphanous, pinkish-cinnamon, rarely deep brown or even violet; spores reniform,  $10-12 \times 5-6 \mu$ ; conidia similar to the spores.

*Ulocolla foliacea*, Brefeld.

*Tremella foliacea*, Cke., Hdbk., p. 345.

On stumps of pine and other trees, reaching to 1-2 inches diameter.

#### TREMELLA. Dill. (emended). (figs. 14, 15, p. 56.)

Gelatinous, tremelloid, immarginate, generally smooth (i.e. not papillose); basidia globose, longitudinally cruciately quadripartite, each quadrant of the basidium elongating into a long, stout sterigma; spores subglobose, continuous; on germination a tube is formed that is covered with broadly elliptical sporidiola; conidia subglobose, racemose in sporiferous conceptacles in the sporophore, have occurred in some species.

*Tremella*, Dill., Hist. Musc., p. 41; Sacc. Syll. vi. p. 780.

##### Sect. I. Mesenteriformes.

Cartilagineo-gelatinous, lobes large, foliaceous, naked (i.e. not pruinose with the spores).

*Tremella fimbriata*. Pers.

Very soft and gelatinous, tufted, erect, lobes flaccid, corrugated, margins cut, blackish-olive, spores subpyriform.

*Tremella fimbriata*, Persoon, Obs. 2, p. 97; Cke., Hdbk., p. 344.

On dead branches. Two to three inches high and the same in diameter when well developed. Easily recognised by its dark colour.

*Tremella frondosa*. Fries.

Gelatinous, tufted, large; lobes undulate and contorted,

smooth (not corrugated); base firmer, plicate; pale pinkish-yellow; spores subglobose, apiculate, 7-9  $\mu$ .

*Tremella frondosa*, Fries, Syst. Myc. ii. p. 212; Cke., Hdbk., p. 344.

On trunks of oak, &c. The largest species of the genus sometimes 4 in. high and broad, or even more.

***Tremella lutescens*. Pers. (fig. 15, p. 56.)**

Very soft and gelatinous, lobes crowded, entire, undulately gyrose, pale then yellowish; spores subglobose, 12-16  $\mu$  diameter; conidia globose, 1.5-2  $\mu$  diameter.

*Tremella lutescens*, Persoon, Syn., p. 622; Cke., Hdbk., p. 345.

On fallen branches, stumps, &c. Very soft and tremulous,  $\frac{1}{2}$ -2 inches broad.

The conidia are produced at the tips of densely corymbose branches in the substance of the fungus.

### *Sect. II. Cerebrinae.*

Lobes short, contorted, brain-like, pruinose with the white spores.

***Tremella mesenterica*. Retz. (fig. 14, p. 56.)**

Gelatinous but firm, bright orange-yellow, variously contorted; lobes short, smooth, pruinose with the white spores at maturity; spores broadly elliptical, 6-9  $\mu$  diam.; conidia 1-1.5  $\mu$  diam.

*Tremella mesenterica*, Retz. in Vet. Ak. Handl. 1769, p. 249; Cke., Hdbk. p. 345.

On dead branches. Very variable in form, but known by the bright orange colour. From  $\frac{1}{2}$ -2 inches across.

***Tremella intumescens*. Eng. Bot.**

Gelatinous; subcaespitose, rounded, broken up into numerous tortuous lobes, brown, shining, obscurely dotted, becoming darker when dry; spores oblong, slightly curved, 12-14  $\times$  3-4  $\mu$ .

*Tremella intumescens*, Eng. Bot., tab. 1870; Cke., Hdbk., p. 346.

On trunks of beech, &c. From 1-2 inches across.

**Tremella vesicaria.** Bull.

Gelatinous but externally firm, soft and bladdery within, much contorted, pallid or yellowish; spores  $10 \times 6 \mu$ .

*Tremella vesicaria*, Bulliard, t. 427, f. 3; Cke., Hdbk., p. 345.

On the ground. Erect, tufts reaching 2 in. high and broad, or even more; brownish when old.

*Sect. III. Crustaceae.*

Effused and applanate.

**Tremella viscosa.** Berk.

Small, depressed, undulate, white then grey, spores broadly elliptical,  $7-9 \times 6 \mu$ .

*Tremella viscosa*, Berk., Outl., p. 288; Cke., Hdbk., p. 347.

*Thelephora viscosa*, Berk., Engl. Fl., vol. v. p. 171.

On dead wood. Forming grey, adpressed, small gelatinous patches. When dry resembling a thin, closely adpressed skin of a brown colour.

**Tremella epigaea.** B. & Br.

Gelatinous, effused and depressed, undulated and contorted, thin, white, at length pruinose; spore subglobose,  $6 \times 4 \mu$ .

*Tremella epigaea*, Berk. and Broome, Ann. Nat. Hist., no. 373; Cke., Hdbk., p. 348.

On the naked soil. Forming a thin, white stratum.

*Sect. IV. Tuberculiformes.*

Small, suberumpent.

**Tremella indecorata.** Somm.

Gelatinous, erumpent, sessile, rounded, moist, opaque, plicate, dingy-olive, becoming blackish-brown when dry; spores globose,  $7-9 \mu$  diameter.

*Tremella indecorata*, Sommerf. Lapp., p. 306; Cke., Hdbk., p. 346.

On willow, poplar, &c. Erumpent, 3-4 lines across, dirty-grey, livid, or olive-brown, pitch-brown when dry.

**Tremella moriformis.** Berk.

Sessile, erumpent, roundish or oblong, sinuated, black,

with purple tinge, internally deep purple, opaque, firm; spores subglobose, apiculate,  $5 \times 4 \mu$ .

*Tremella moriformis*, Berk., Outl., p. 287; Cke., Hdbk., p. 346.

On rotten wood. Small, resembling mulberries in miniature. Gives out a purple colour when treated with potassic hydrate.

***Tremella versicolor*. Berk.**

Gelatinous but firm, orbicular, orange, at length brown; spores broadly elliptic-apiculate,  $6 \times 4 \mu$ .

*Tremella versicolor*, Berk., Outl., p. 288; Cke., Hdbk., p. 347.

On *Corticium nudum*. Forming minute orange, tear-like, convex spots on the hymenium of the *Corticium*, paler when young, at length assuming a rufous tinge. (Berk.)

***Tremella atrovirens*. Fries.**

Minute, erumpent, minutely papillate and rugose, sooty-green when moist, blackish when dry; gregarious or confluent; spores ellipsoid, subapiculate,  $12-15 \times 10-13 \mu$ .

*Tremella atrovirens*, Fries, Syst. Myc. ii. p. 232.

On dead branches of *Sarothamnus*. One to three lines in diameter.

***Tremella clavata*. Pers.**

Solitary, simple, incrassated, reddish flesh-colour, becoming black at the base.

*Tremella clavata*, Pers., Ic. Pict., t. 10, f. 1; Cke., Hdbk., p. 347.

On stumps. About 1 inch high, 2 lines broad, blackish below and slightly twisted (Berk.).

The present species has not occurred recently, unless indeed it is a form of *Tremella sarcoides*, mentioned below.

***Tremella tubercularia*. Berk.**

Erumpent, stem cylindrical, greyish, head subglobose, smooth or plicate, whitish, becoming dark when dry; conidia  $2 \times .5 \mu$ , straight or slightly curved.

*Tremella tubercularia*, Berk., Outl., p. 288; Cke., Hdbk., p. 347.

On fallen branches, especially oak. Consisting of a rather thick stem with a more or less rounded head, 2-4 lines high. When dry of a semi-transparent horny appearance.

The present species is certainly not a *Tremella*, but the conidial form of some species; but is left where placed by Berkeley until its true position is ascertained.

***Tremella sarcoides*. Sm.**

The conidial stage of *Ombrophila sarcoides*, an ascigerous fungus.

Caespitose, subgelatinous, flesh-colour or purplish, club-shaped, then compressed, lobed and plicate, conidia elliptical,  $4-6 \times 3 \mu$ .

On stumps and trunks.

**NAEMATELIA. Fries. (fig. 3, p. 56.)**

Subgelatinous but firm, convex, solid, with a firm nucleus; basidia subglobose, cruciate; spores broadly elliptical, continuous.

*Naematelia*, Fries, Syst. Myc. ii. p. 227; Cke., Hdbk., p. 350.

Readily distinguished by the presence of a central solid portion composed of interwoven hyphae, everywhere above covered with a thick gelatinous spore-bearing portion.

***Naematelia encephala*. Fries. (fig. 3, p. 56.)**

Subsessile, pulvinate, variously plicate and contorted, firm; pale flesh-colour; nucleus large, white; spores pear-shaped,  $15-18 \mu$  diameter.

*Naematelia encephala*, Fries, Syst. Myc. ii. p. 227; Cke., Hdbk. p. 350.

On pine, &c. From  $\frac{1}{2}$ -2 inches across, pulvinate, with a stem-like base entering the matrix.

***Naematelia nucleata*. Fries.**

Sessile, flattened, gelatinous, more or less contorted, white, then yellowish, nucleus small, white; spores broadly elliptical,  $7 \mu$  long.

*Naematelia nucleata*, Fries, Syst. Myc. ii. p. 227; Cke., Hdbk., p. 350.

On rotten wood. From  $\frac{1}{4}$ - $\frac{3}{4}$  inch across, depressed, superficially resembling *Exidia albidia*, but distinguished by the central hard, white nucleus. When dry the outermost gelatinous portion contracts, the nucleus alone being visible.

***Naematelia virescens.* Corda.**

Small, subgelatinous, sessile, suborbicular, depressed, contorted, dingy green; spores elliptical, apiculate,  $18 \times 11 \mu$ .

*Naematelia virescens*, Corda, Icon. iii. f. 90; Cke., Hdbk., p. 350.

On branches of furze, &c. About  $\frac{1}{2}$  in. across, but size variable, greenish.

**GYROCEPHALUS.** Pers. (f. 10, p. 56.)

Sporophore erect, substipitate, subspathulate, irregular, tremelloso-cartilaginous; basidia globose, soon longitudinally and crucially septate, sterigmata 2 or 4, elongated, thick; spores ovate-piriform, continuous, not producing sporidiola on germination so far as is known.

*Gyrocephalus*, Pers., Mem. Soc. Linn., Paris, iii., p. 77 (1824); Sacc. Syll. vi. p. 795.

Distinguished by being more or less distinctly stipitate, sporophore flattened, spathulate, hymenium confined to one surface only.

***Gyrocephalus rufus.* Jacq. (fig. 10, p. 56.)**

Erect, cartilagineo-gelatinous, stem very variable in length, subspathulate, or variously contorted or lobed; orange with a rosy tinge; hymenium inferior, very smooth; spores elliptical, apiculate at the base,  $12-15 \times 8-10 \mu$ .

*Gyrocephalus rufus*, Jacq. Misc. 1, p. 143, t. 14.

*Guepinia helvelloides*, Fries, Hym. Eur., p. 697.

On the ground, also on fragments of wood, &c. Exceedingly variable, stem elongated or almost wanting; pileus spathulate, variously contorted, entire or lobed. One inch or more in height.

**TREMELLODON.** Pers. (figs. 4-5, p. 48.)

Gelatinous; pileate; hymenium inferior, covered with acute gelatinous spines; basidia subglobose, cruciately divided, producing four stout, elongated sterigmata, spores subglobose, continuous.

*Tremellodon*, Pers., Myc. Eur. ii. p. 172; Stev., Brit. Fung., p. 247.



*Hydnum*, Cke., Hdbk., p. 298.

A very remarkable genus, with the gelatinous consistency, basidia, and spores of the *Tremellini*, but superficially resembling the genus *Hydnum* in the distinct spines present on the hymenium.

*Tremellodon gelatinosum*. Pers. (figs. 4-5, p. 48.)

Gelatinous, tremelloid, dimidiate or fan-shaped, 1-3 in. across, thick, extended behind into a lateral thick, stem-like base, pileus brownish with opalescent shades, very minutely granular; hymenium watery-grey; teeth stout, acute, 1-2 lines long, whitish; spores subglobose, 7-8  $\mu$  diam.

*Tremellodon gelatinosum*, Pers., Myc. Eur. ii. p. 172; Stev., Fung., p. 247.

*Hydnum gelatinosum*, Cke., Hdbk., p. 298.

On pine stumps and on the ground. Gregarious, very variable in form and size but unmistakable, being our only tremelloid fungus with true spines.

## DACRYOMYCETAE.

DACRYOMYCES. Nees. (figs. 12, 13, p. 56.)

Gelatinous, homogeneous, rather plicato-gyrose, everywhere covered with the hymenium; basidia terminating ordinary hyphae, tereti-clavate, bifurcate at the apex when mature; spores cylindric-oblong, curved, at maturity or during germination variously septate, sometimes becoming muriform; in conidia-bearing sporophores the conidia, which more or less resemble the spores in size and form, are produced in chains.

*Dacryomyces*, Nees, Syst., p. 89; Sacc., Syll. vi. p. 796.

Minute gelatinous fungi occurring on dead wood, often of an orange or yellow colour.

*Dacryomyces macrosporus*. B. & Br.

Gelatinous, tuberculate, rosy; spores cylindric-oblong, becoming 3-5 septate, constricted at the septa.

*Dacryomyces macrosporus*, B. and Br., Ann. Nat. Hist. n. 1374, t. 7, f. 1; Fr., Hym. Eur., p. 698.

On dry branches. Forming thin patches  $\frac{1}{4}$  in. long.

***Dacryomyces deliquescens*. Duby.**

Gelatinous, roundish or irregular, convex, gyrose, yellow, hyaline, basal portion root-like and entering the matrix, spores cylindrical, obtuse, curved, 3-septate,  $15-17 \times 6-7 \mu$ .

*Dacryomyces deliquescens*. Duby, Bot. Gall., p. 729; Cke., Hdbk., p. 351.

On pine wood. In perfection during the winter months. Forming yellow subcircular convex masses 1-4 lines broad, often growing in long lines out of cracks in the wood.

***Dacryomyces stillatus*. Nees. (fig. 12, p. 56.)**

Gelatinous, rounded, convex, more or less plicate, persistently orange; spores cylindrical, curved, multi-septate,  $18-22 \times 7-8 \mu$ .

*Dacryomyces stillatus*. Nees, Syst., p. 89, f. 90; Cke., Hdbk., p. 352.

On pine and other decaying wood. Distinguished from *D. deliquescens* by its rather smaller size, firmer substance, deeper orange colour, and larger, multi-septate spores. Usually barren.

***Dacryomyces chrysocomus*. Fries. (fig. 13, p. 56.)**

Gelatinous, orbicular, when young spherical, soon becoming collapsed and saucer-shaped, at length almost flat, golden yellow, not wrinkled; spores elliptical, multi-septate,  $18-25 \times 9-10 \mu$ .

*Dacryomyces chrysocomus*, Fries, Hym. Eur., p. 699; Cke. Hdbk., p. 352.

On rotten fir-wood, &c. Distinguished by being very thin, pellucid, and saucer-shaped, like a minute *Peziza* or *Calloria*. About 1 line across.

***Dacryomyces succineus*. Fries.**

Subgelatinous, gregarious, smooth, amber-colour, paler externally when moist, rather thick, collapsing when dry; spores cylindrical, straight, ends obtuse,  $14 \times 2 \mu$ , 2-guttulate.

*Dacryomyces succineus*, Fries, Hym. Eur., p. 699.

On pine leaves. The present minute species is stated by

Phillips to be the conidial stage of *Peziza electrica*, Phil. and Plow. in Grevillea, June, 1880.

***Dacryomyces sebaceus*. B. & Br.**

Gelatinous but firm, cup-shaped, whitish, spores cylindrical, slightly curved, multi-septate,  $12-13 \times 7-8 \mu$ .

*Dacryomyces sebaceus*, B. and Br., Ann. Nat. Hist., no. 1305; Cke., Hdbk., p. 351.

On branches. Conspicuous in wet weather, 2-4 lines broad.

***Dacryomyces torta*. Massee.**

Gelatinous, rounded, depressed, gyroso-tuberculate, yellow or orange; spores cylindrical, curved, 3-septate,  $12 \times 4-5 \mu$ .

*Dacryomyces torta*, Mass.

*Tremella torta*, Berk., Outl., p. 288.

On decorticated oak branches. Distinguished from *Dacryomyces deliquescens* by the smaller spores. From 3-4 lines across.

***Dacryomyces* (?) *vermicularis*. B. & Br.**

Minute, grey, worm-shaped, sporophores globose,  $12.5 \mu$ ; spores globose, pallid rufous,  $5 \mu$  diameter.

*Dacryomyces* (?) *vermicularis*, B. and Br., Ann. Nat. Hist., no. 1700.

On rotten wood. No specimen exists in Berkeley's herbarium, hence it remains doubtful as to the correct position of the present species, which does not appear from the brief description to agree with *Dacryomyces* as at present understood.

**DACRYOPSIS. Massee. (figs. 5, 6, p. 56.)**

Small, subgelatinous, stipitate, fertile portion capitate, at first covered with conidiophores; conidia terminal at apex of conidiophores or short lateral branchlets; conidia minute, hyaline, continuous, forming a dense stratum; basidia cylindrical, bifurcate, aseptate, springing from the interlaced hyphae at the apex of the stem, either contemporaneous with or later than the conidia. Spores elongated, colourless, continuous, or septate.

*Dacryopsis*, Massee, Journ. Mycol. (1891), p. 180; Grevillea, 1891, p. 23.

*Coryne*, Berk. (in part).

*Ditiola*, Fries (in part).

During the conidial stage the structure is identical with that of *Tubercularia*, and later on the basidia appear on the same stroma.

***Dacryopsis nuda*.** Massee. (figs. 5 and 6, p. 56.)

Gregarious; head hemispherical, flattened below, reddish-orange, 3-4 mm. diameter; stem short, stout, white or tinged yellow, minutely tomentose; 3-4 × 2-2.5 mm.; conidiophores appearing before the basidia, linear straight, aseptate, simple or rarely with 1-3 short branchlets near the apex, 35-40 × 1.5 μ; conidia elliptic-oblong, 3 × 1 μ; basidia projecting above the conidiophores, cylindrical, bifurcate, 56-60 × 5-6 μ; spores elliptic-oblong, with an oblique apiculus, 3-septate, 14 × 5 μ.

*Dacryopsis nuda*, Massee, Journ. Mycol. (1891), p. 181; Grev. (1891), p. 24.

*Ditiola nuda*, Berk., Ann. Nat. Hist., Ser. ii., vol. ii. p. 267. On fir stumps, &c.

GUEPINIA. Fr. (fig. 16, p. 56.)

Fungi cartilagineo-gelatinous, versiform, the two surfaces diverse in structure; substipitate; hymenium unilateral; basidia linear, deeply bifurcate, bisporous; spores curved. Chains of conidia produced at the tips of hyphae springing from the surface opposed to the hymenium.

*Guepinia*, Fr., Elenchus ii. p. 30; Sacc. Syll. vi. p. 805.

***Guepinia peziza*.** Tul. (fig. 16, p. 56.)

Cup-shaped, sessile, yellow or orange, everywhere glabrous, attached obliquely by the back; stem slender; sporophores subclavate; spores elliptic-oblong, at first continuous, then 1-3-septate, 10 × 4 μ.

*Guepinia peziza*, Tulasne, Ann. Sci. Nat. 1853, p. 224.

On dead branches, trunks, &c. Cup oblique, often irregular, about ½ in. across, often minutely hoary above; tinged with pink when dry.

## DITIOLA. Fries.

Stroma firm, more or less stem-like; hymenium discoid, gelatinous; basidia furcate; spores at first continuous, then 1-septate.

*Ditiola*, Fries, Syst. Myc. ii. p. 170.

*Ditiola radicata*. Fries.

Stroma rooting, exposed portion thick, firm, simple or branched, white, villous, expanded at the apex and terminated by the plane or slightly depressed, golden-yellow hymenium; spores elliptic-oblong, mostly curved, uni-septate,  $8-12 \times 4-5 \mu$ .

*Ditiola radicata*, Fries, Syst. Myc. ii. p. 170; Cke., Hdbk., p. 353, fig. 101.

On wood, amongst pine leaves, &c. Stem  $\frac{1}{4}$ – $\frac{3}{4}$  in. high, hymenium 2–5 lines across.

## APYRENIUM. Fries.

Subgelatinous, subglobose, hollow; hymenium covering the whole of the outer surface; spores continuous.

*Apyrenium*, Fries, Summ. Veg. Scand., p. 470; Cke., Hdbk., p. 352.

Distinguished amongst the *Tremellineae* by being inflated and constantly hollow. A spurious genus, the forms being the conidial stage of species of *Hypocrea*.

*Apyrenium lignatile*. Fries.

Sessile, rounded and variously deformed, smooth, internally and externally pallid or yellowish, collapsing when dry and becoming rugulose; spores rounded.

*Apyrenium lignatile*, Fries, Hym. Eur., p. 700; Cke., Hdbk., p. 352, fig. 100.

On pine wood, decaying fungi, &c., in damp places. About the size of a pea, sometimes with a reddish tinge.

The conidial stage of *Hypocrea rufa*.

*Apyrenium armeniacum*. B. & Br.

Subgelatinous, lobed, peach colour; spores obovate,  $13 \times 8 \mu$ .

*Apyrenium armeniacum*, B. & Br., Ann. Nat. Hist., no. 1141, pl. ii., f. 2; Cke., Hdbk., p. 352.

On oak chips, decaying fungi, &c. Smaller than *A. lignatite* and more irregularly lobed.

The conidial stage of *Hypocrea gelatinosa*.

#### CALOCERA. Fr. (fig. 11, p. 56.)

Gelatinoso-cartilaginous, horny when dry, vertical, sub-cylindrical, simple or branched, viscid, without a distinct stem. Hymenium covering every part of the hymenophore; basidia terete, apex furcate or bilobed, each lobe bearing a single 1-spored sterigma. Spores oblong, curved, septate on germination and producing heads of ellipsoid sporidiola.

*Calocera*, Fries, Syst. Myc. i. p. 485; Sacc., Syll. vi. p. 732.

In habit resembling the genus *Clavaria*, but distinguished by being subgelatinous and viscid when moist, rigid and horny when dry, and more especially by the furcate basidia.

##### \* *Branched.*

*Calocera viscosa*. Fries. (fig. 11, p. 56.)

Branched, viscid and tough when moist, rooting, smooth, orange-yellow; branches straight, repeatedly forked; spores cylindric-oblong, apiculate, slightly curved,  $9-10 \times 4-5 \mu$ .

*Calocera viscosa*, Fries, S. M. i. p. 486; Cke., Hdbk., p. 339.

On pine stumps, &c. Generally tufted, 1-2 in. high, root pale, often very long and penetrating the wood.

##### \* *Unbranched, caespitose.*

*Calocera tuberosa*. Fries.

Caespitose, tough, simple, linear, sub-acute, yellowish; two or three springing from a thick, strigose, subglobose rooting tuberous base.

*Calocera tuberosa*, Fries, S. M. i. p. 486; Cke., Hdbk., p. 339.

On trunks. Clubs up to 2 in. high, slender.

**Calocera cornea. Fr.**

Tufted, rooting, clubs smooth, viscid, subulate, simple or rarely with a minute branchlet, orange-yellow or pale yellow, several connate at the base; spores cylindric-oblong,  $7-8 \times 5 \mu$ .

*Calocera cornea*, Fries, S. M. i. p. 486; Cke., Hdbk., p. 339.

On stumps and decorticated trunks, especially oak. Rigid when dry. Known by the tufted, tapering and pointed sporophores, which vary from  $\frac{1}{4}$ – $\frac{3}{8}$  in. high.

\*\*\* *Unbranched, solitary.*

**Calocera striata. Fr.**

Simple, solitary,  $\frac{1}{2}$ –1 in. high, linear, even when dry, yellow; base abrupt, encircled with white tomentum.

*Calocera striata*, Fries, Epicr., p. 581; Cke., Hdbk., p. 340.

On trunks. Occasionally two sporophores spring from the same base, but they are not habitually caespitose as in *C. cornea*.

*Var. epiphylla*, Fr., differing from the type in being 2–3 in. high, smooth at the base, and abruptly rooting and growing amongst pine leaves, has not, so far as I am aware, occurred in this country.

**Calocera striata. Fr.**

Simple, solitary, about  $\frac{1}{2}$  in. high, acute, longitudinally striate or rugose when dry, yellow; spores cylindric-oblong,  $8 \times 4 \mu$ .

*Calocera striata*, Fries, Epicr., p. 582; Cke., Hdbk., p. 681.

On trunks. Somewhat resembling *C. cornea*, but distinguished by being solitary, and striate when dry.

**Calocera glossoides. Fr.**

Simple, solitary, yellow, somewhat tremellose, round and slender at the base, incrassated and compressed above, obtuse; spores elliptic-oblong, slightly curved.

*Calocera glossoides*, Fries, S. M. i. p. 487.

On trunks. About  $\frac{1}{2}$  in. high.

*FAM. II.*

## CLAVARIEAE.

Fleshy, not coriaceous; erect, simple and club-shaped or variously branched; hymenium covering the whole of the sporophore.

Distinguished from the Thelephoreae, as *Lachnocladium* (not British), that grow erect, and are branched and *Clavaria*-like by being soft and fleshy and not subcoriaceous, and also in having the hymenium completely surrounding the hymenophore, and not confined to one side, as in *Lachnocladium*.

## KEY TO THE GENERA.

\* *Very much branched, branches compressed, plate-like, crisped.*

**Sparassis.**

\*\* *Club-shaped and simple or variously branched, branches terete.*

† *Stem distinct from hymenophore.* x

**Typhula.**

†† *Stem not distinct from hymenophore.*

**Clavaria.**—Fleshy, simple or branched, branches terete.

**Pistillaria.**—Minute, club-shaped, simple, rigid when dry.

**Pterula.**—Small, branches very numerous and very slender, forming a brush-like tuft.



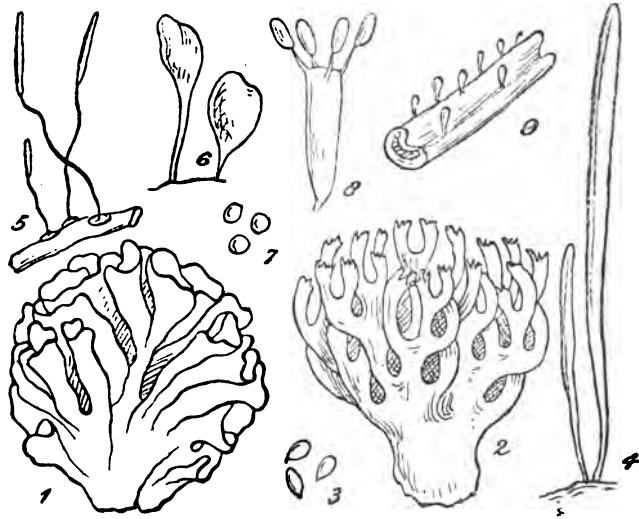


Fig. 1, section of *Sparassis crispa*, much reduced :—Fig. 2, *Clavaria abietina*, nat. size ;—Fig. 3, spores of same, highly mag. ;—Fig. 4, *Clavaria inaequalis*, nat. size ;—Fig. 5, *Typhula erythropus*, nat. size ;—Fig. 6, *Pistillaria tenuipes*, nat. size ;—Fig. 7, spores of same, highly mag. ;—Fig. 8, *Clavaria pistillaris*, basidium bearing four spores, highly mag. ;—Fig. 9, *Pistillaria quisequilaris*, nat. size.

**SPARASSIS. Fr. (fig. 1, p. 74.)**

Fleshy, branched, branches flattened, lacinate, variously contorted and grown together, entirely covered with the hymenium.

*Sparassis*, Fries, Hym. Eur., p. 666 ; Cke., Hdbk., p. 330.

Forming large, irregularly globose, compact tufts, the brittle branches variously flattened and contorted, with the tips much cut.

***Sparassis crispa*. Fr. (fig. 1, p. 74.)**

Fragile ; very much branched, branches very irregular,

forming a compact head, springing from a thick, stem-like, rooting base, whitish or pale ochraceous; spores pale ochraceous,  $5-6 \times 3-4 \mu$ .

*Sparassis crispa*, Cke., Hdbk., n. 958, f. 87; Stev., Brit. Fung. ii. p. 289; Hogg and Johnst., t. 24.

Amongst heather, in fir woods, &c. Variable in size, sometimes forming masses 18 in. across.

### CLAVARIA. Vaill. (figs. 2, 3, 4, 8, p. 74.)

Sporophore erect, simple, and more or less club-shaped, or variously, often excessively branched; hymenium covering every part of the sporophore, which is not furnished with a distinct stem; basidia tetrasporous; spores colourless or coloured.

*Clavaria*, Vaill., Paris, p. 89 (in part); Fr., Syst. Myc. i. p. 465.

Growing on the ground or rarely on wood. Fleshy and brittle, often very bright-coloured. *Calocera*, a genus resembling a branched *Clavaria* in habit, is distinguished by its viscosity and subgelatinous nature, also by the subglobose, cruciately septate basidia.

#### I. RAMARIA. *Branched, branches attenuated upwards.*

\* *Leucosporae*. *Spores white or dingy; not ochraceous.*

† *Colour clear yellow, red or violet.*

#### *Clavaria botrytes*. Pers.

Fragile, basal portion thick, fleshy, passing into numerous irregular, crowded, thick branches, which are thickened at the extremity and broken up into numerous densely-crowded, reddish, toothed branchlets; spores white,  $8 \times 5 \mu$ .

*Clavaria botrytes*, Cke., Hdbk., n. 959; Badham, Esc. Fung. i. t. 16, f. 2; Stev., Brit. Fung. ii. p. 290.

In woods. Large, from 3-6 in. across, 3-4 in. high; the subglobose ends of the branches are composed of numerous crowded, small branchlets varying from rose-colour to dingy

red; branches and flesh white. Looks like the heart of a cauliflower.

***Clavaria amethystina*. Bull.**

Violet, fragile, very much branched, branches round, smooth, even, obtuse; spores elliptical, pale ochraceous,  $10-12 \times 6-7 \mu$ .

*Clavaria amethystina*, Berk., Outl. 279, t. 18, f. 2 (small, subsimple form, not by any means typical); Cke., Hdbk., n. 960; Stev., Brit. F., p. 291.

Amongst grass in woods and pastures. From 1-3 in. high, very much branched or almost simple. Known by the violet colour.

***Clavaria fastigiata*. Linn.**

Tufted, very much branched, branchlets fastigate at the tips, rather tough, egg-yellow; spores white, irregularly globose,  $4-6 \mu$ .

*Clavaria fastigiata*, Berk., Outl. 279; Cke., Hdbk., n. 961; Stev., B. Fung. ii. 291.

*Clavaria pratensis*, Berk., Eng. Fl. v. 5, p. 174.

Amongst grass in pastures. About 1 in. high, distinguished by clear egg-yellow colour.

***Clavaria muscoides*. Linn.**

Clear yellow, slightly tufted, stems slender, tomentose at the base, once or twice branched above, axils rounded; spores white, subglobose,  $5-6 \mu$ .

*Clavaria muscoides*, Berk., Outl. 279; Cke., Hdbk. n. 962; Stev., Brit. Fung. 291.

In pastures. From  $1-1\frac{1}{2}$  in. high, somewhat resembling *C. fastigiata*, but the stems are more slender, tomentose at the base, and are not branched so near to the base nor so repeatedly; branchlets thin, tapering, axils rounded.

***Clavaria curta*. Fries.**

Greenish-yellow, much branched, branches short, closely crowded, tips blunt, stem not distinct; spores colourless, subglobose,  $5-6 \mu$ .

*Clavaria curta*, Fr., Hym. Eur., p. 668; Stev., Brit. Fung. ii. 291.

In grassy places. A small species not 1 in. high.

†† *Colour white or grey.*

**Clavaria coralloides.** Linn.

Rather fragile, white, partly hollow; trunk rather thick, short, breaking up into numerous repeatedly forked branches, axils rounded, branches unequal, subcompressed; ultimate branchlets crowded, acute; spores subglobose, apiculate, pale ochraceous,  $10 \times 8 \mu$ .

*Clavaria coralloides*, Linn., Suec., n. 1268; Stev., Fung., p. 292.

On the ground in woods. Usually caespitose, growing into each other, 2-4 in. high. Sometimes scattered and without the branches developed, then approaching *C. rugosa*, but not longitudinally wrinkled. Other forms approach *C. cristata*, with which it agrees exactly in the spores, but differs in the numerous small pointed branchlets at the tips of the branches.

**Clavaria cinerea.** Bull.

Stem short, thick, whitish, branches livid grey, brittle, stuffed, numerous, irregular, sometimes compressed, wrinkled; spores white, subglobose,  $5 \mu$  or  $6 \times 5 \mu$ .

*Clavaria cinerea*, Cke., Hdbk., n. 265; Stev., B. Fung. ii. p. 292; Grev., Scot. Crypt. Fl., t. 64.

In woods. Often gregarious or crowded, 1-2 in. high, branches numerous, irregular, with a few short branchlets, or flattened and cut at the tip into several slender, pointed branchlets. Distinguished by the bright grey colour.

**Clavaria umbrinella.** Sacc.

Pale umber, about 1 in. high, sparingly branched, branches and branchlets cylindrical, obtuse, forked, axils usually rounded; spores subglobose, apiculate,  $9-10 \times 7-8 \mu$ .

*Clavaria umbrinella*, Sacc., Syll. vi. n. 7943.

*Clavaria umbrina*, Berk., Outl. 279, t. 18, f. 4.

Berkeley's specific name was antedated by L  veille.

On the ground. Tufts usually small, stem sometimes rather thick and minutely velvety. Probably nothing more than a small dingy form of *C. cristata*.

**Clavaria cristata.** Holmsk.

Tough, white or tinged with dirty ochre, base short, stout,

dividing into numerous irregular branches that become flattened upwards and cut at the apex into acute branchlets; spores pale ochraceous, subglobose, apiculate,  $10 \times 8 \mu$ .

*Clavaria cristata*, Grev., Scot. Cr. Fl., t. 190; Cke., Hdbk., n. 966; Stev., Brit. Fung. ii. p. 292.

*Clavaria fuliginea*. Pers.

In woods. Forming tufts 1-2 in. high, known by the flattened branches being divided into several pointed branchlets at the tips like a stag's horn; this last character is the only one that separates the present species from *C. coralloides*.

*Clavaria Krombholzii*. Fr.

Tufted, fragile, white, shining, even, sparingly branched, branches more or less compressed, acute; spores white, broadly elliptical,  $10-11 \times 7-8 \mu$ .

*Clavaria Krombholzii*, Fr., Hym. Eur. 669; Stev., Brit. Fung. 293.

In pastures. Somewhat resembling *C. rugosa*, differs in being brittle and even, not wrinkled, 1-3 in. high.

*Clavaria rugosa*. Bull.

Rather tough, whitish, thickened upwards, simple or with a few irregular obtuse branches, longitudinally rugose; spores white, irregularly globose,  $8-10 \mu$ .

*Clavaria rugosa*, Berk., Outl., t. 18, f. 3; Cke., Hdbk., n. 967; Stev., Brit. Fung. ii. p. 293.

In woods. Solitary or gregarious, 2-4 in. high, up to  $\frac{1}{4}$  in. thick, white or dingy; simple and club-shaped or variously branched, tips blunt. Distinguished by the distinct, irregular longitudinal wrinkles.

*Clavaria Kunzei*. Fries.

Tufted, shining white, rather fragile, very much branched from the base; branches long, frequently forked, of about equal height, axils compressed; spores white, broadly elliptical,  $9-11 \times 8 \mu$ .

*Clavaria Kunzei*, Fries., Hym. Eur., p. 699; Stev., Brit. Fung. ii. 293.

In woods. Tufts 1-2 in. high, distinguished amongst the white species by the numerous, crowded, erect, repeatedly forked equal branches of about equal length.

**Clavaria pyxidata.** Pers.

Tufted, pale, becoming rufescent, trunk variable in length, breaking up into numerous suberect, forked branches, all the tips hollowed out in a cup-like manner and usually with slender branchlets springing from the margin of the cup: spores white, subglobose,  $4 \times 3 \mu$ .

*Clavaria pyxidata*, Pers., Comm., t. 1, f. 1; Stev., Brit. Fung. ii. 293.

On rotten wood, rarely on the ground, and then probably springing from buried branches, &c. Tufted, 1-2 in. high, known by the hollowed-out tips of the branches.

**\*\* Ochrosporae, Spores ochraceous or cinnamon.**

† *Colour yellow, pinkish-yellow, or dingy ochraceous.*

**Clavaria aurea.** Schoeff.

Trunk thick, elastic, pallid, flesh white, dividing into numerous thick branches that become repeatedly divided in a dichotomous manner upwards, and terminate in slender, erect, round, yellow branchlets; spores pale ochraceous, elliptical,  $10-11 \times 5-6 \mu$ .

*Clavaria aurea*, Berk., Outl., p. 280; Cke., Hdbk., n. 909; Stev., Brit. Fung. 294.

In woods. Forming large tufts 2-3 in. high, colourless or almost so below, tips yellow.

**Clavaria formosa.** Pers.

Base thick, elastic, dividing into numerous, crowded, erect branches that become thinner upwards and divided at the apex into several thin, straight, simple or toothed, yellow branchlets, base and main branches pale dirty ochraceous with a red tinge, flesh same colour inside; spores ochraceous,  $9 \times 3-4 \mu$ .

*Clavaria formosa*, Cke., Hdbk. n. 970; Stev., Brit. F. ii. p. 294.

On the ground in woods. Forming large tufts 3-4 in. high, often crowded and extending for several feet. The basal portion of the stem is sometimes whitish.

**Clavaria spinulosa.** Pers.

Trunk stout, pallid; branches numerous, elongated, erect,

crowded, tapering upwards, brownish cinnamon; spores ochraceous, elliptical,  $11-13 \times 5-6 \mu$ .

*Clavaria spinulosa*, Pers., Obs. ii. t. 3, f. 1; Stev., Brit. Fung. 294.

In pine woods. From 2-3 in. high, stem  $\frac{1}{2}$ -1 in., somewhat resembling some forms of *C. abietina*, but distinguished by the very much larger spores and not becoming green when bruised.

***Clavaria abietina*. Schum. (figs. 2, 3, p. 74.)**

Stem short, thick, white, downy; branches numerous, crowded, frequently divided, erect, ochraceous, becoming greenish when bruised; spores ochraceous, elliptical,  $6 \times 3-4 \mu$ .

*Clavaria abietina*, Cke., Hdbk., n. 971; Stev., Brit. Fung. ii. p. 294; Greville, Scot. Cr. Fl. t. 117.

In fir woods. From 1-3 in. high, very much branched from a stout base, branches deep ochre, sometimes rather thick, equal, repeatedly divided, axils rounded, tips abrupt, cristate, at others divided into numerous thin erect branches, the whole plant resembling a birch besom. Taste bitter. Branches longitudinally wrinkled when dry.

***Clavaria flaccida*. Fr.**

Slender, very much branched, flaccid, ochraceous, stem very short, branches crowded, repeatedly forked, upper axils rounded, and the acute terminal branchlets converging; spores ochraceous, broadly elliptical,  $4-5 \times 3 \mu$ .

*Clavaria flaccida*, Berk., Outl., 280; Cke., Hdbk., n. 972; Stev. Brit. Fung. ii. p. 295.

Amongst moss in woods. From 1-2 in. high, closely related to *C. spinulosa*, but colour clearer than ochraceous without any tinge of brown, and the terminal branches converging like forceps. Does not turn green when bruised like *C. abietina*. Mycelium whitish, floccose, creeping over leaves. Stem sometimes  $\frac{3}{4}$  in. long, at others almost obsolete.

***Clavaria crocea*. Pers.**

Saffron-yellow, stem slender, pale, at the apex dividing into a few branches, which again divide in a dichotomous manner; spores ochraceous, elliptical,  $6-7 \times 3-4 \mu$ .

*Clavaria crocea*, Berk., Outl. 280; Cke., Hdbk., n. 973; Stev., Brit. F., ii. 295.

On the ground. From  $\frac{1}{4}$ – $\frac{3}{4}$  in. high, stem slender, for some distance unbranched, bearing at the apex a variable number of dichotomously divided branches; a thin, slender, elegant fungus.

††. *Colour whitish, grey or violet.*

***Clavaria grisea*. Pers.**

Ashy-grey, stem stout, fleshy, branches long, irregular, tapering, rugose, branchlets obtuse; spores pale brown, subglobose,  $9 \times 7-8 \mu$ .

*Clavaria grisea*, Pers., Comm., p. 44; Berk., Outl. 281; Cke., Hdbk., n. 974; Stev., B. Fung. 295.

On the ground in woods. From  $1\frac{1}{2}$ –3 in. high, stem about 1 in. long,  $\frac{1}{4}$ – $\frac{3}{4}$  in. thick, branches stout; resembling robust forms of *C. cinerea*, best known by the large, coloured spores.

***Clavaria condensata*. Fr.**

Reddish-tan colour, very densely branched from the base, branches crowded, parallel, even, fastigiate at the apex, where they are yellowish, not changing colour when bruised; spores pale ochraceous,  $9 \times 7 \mu$ .

*Clavaria condensata*, Fr., Hym. Eur., p. 672; Stev., Brit. Fung. ii. p. 295.

On the ground. Trunk absent, the densely crowded, straight, subequal branches springing from the base; 3–4 in. high; mycelium white, fleecy, running amongst leaves.

†††. *Growing on wood.*

***Clavaria stricta*. Pers.**

Pale dull yellow, becoming brownish when bruised; stem distinct, short, branches numerous, straight, crowded together, tips acute; spores pale ochraceous,  $6-8 \times 4-5 \mu$ .

*Clavaria stricta*, Berk., Outl. 281, t. 18, f. 5; Cke., Hdbk., n. 970; Stev., Brit. Fung. 295.

On trunks in woods. Densely branched, branches crowded, repeatedly forking, tips usually with 2–3 pointed acute branchlets; about 2 in. high.



**Clavaria crispula.** Fr.

Tan-colour, becoming ochraceous, stem rather slender, with downy rooting strands of mycelium; branches numerous, wavy, spreading, repeatedly dividing, terminal branchlets acute, spreading; spores pale yellow, elliptical,  $5 \times 3 \mu$ .

*Clavaria crispula*, Berk., Outl. 281; Cke., Hdbk., n. 976; Stev., B. Fung. ii. 296.

At the base of trunks. Stem thin, branches numerous. lax, rather wavy or flexuous, 2-3 in. high.

II. SYNCORYNE. *Clubs almost simple, tufted at the base.*

† *Reddish.*

**Clavaria purpurea.** Fr.

Purple, tufted, simple, acute, becoming hollow and compressed; spores colourless, elliptical, with a minute apiculus,  $8 \times 4-5 \mu$ .

*Clavaria purpurea*, Berk., Outl., p. 281; Cke., Hdbk., n. 977; Stev., Fung. Brit. ii. p. 296.

Amongst grass. Simple, caespitose, 3-5 in. high; tip tapering, acute, 3-4 lines thick in the centre, sometimes tinged with brown or red.

**Clavaria rufa.** Fl. Dan.

Reddish brown, gregarious, not tufted, simple or slightly cleft at the obtuse apex, straight or generally flexuous or variously deformed; spores colourless, elliptical,  $7 \times 5 \mu$ .

*Clavaria rufa*, Fl. Dan., t. 775, f. 1; Stev., B. Fung. ii. p. 296.

On the ground. Scattered, simple or with 1-2 irregular branchlets, tip blunt or acute, often cleft, 1-1½ in. high, 2-3 lines thick, very frequently curved or twisted and compressed.

**Clavaria rosea.** Fr.

Rose-colour, deep or pale, in small tufts; simple, fragile, stuffed, often becoming yellowish at the apex; spores colourless, globose,  $3 \mu$ .

*Clavaria rosea*, Berk., Outl. 281; Cke., Hdbk., n. 978; Stev., B. Fung. ii. p. 296.

Amongst grass or moss. Generally sparingly tufted, rose-pink, 1-1½ in. high.

†† *Yellowish or White.*

***Clavaria fusiformis.*** Sow.

Tufted, connate at the base, elongato-fusiform, primrose-yellow, simple or rarely unequally branched above, tip contracted into a short, brownish, spine-like point, smooth, soon hollow; spores pale yellow, globose, 4-5  $\mu$ .

*Clavaria fusiformis*, Sowerby, Fung., t. 224; Cke., Hdbk., n. 979, fig. 89; Stev., Brit. Fung. ii. p. 297.

*Clavaria ceranoides*, Stev., Brit. Fung. ii. 297; Cke., Hdbk., n. 980.

In woods, &c. Tufted, rather brittle, 2-3 in. high, 2-3 lines thick, becoming hollow, often compressed and collapsed, straight, or sometimes rather flexuous, sometimes with one or more short branches.

***Clavaria inaequalis.*** Fl. Dan. (fig. 4, p. 74.)

Yellow, gregarious or fasciculate, fragile, stuffed, clavate, apex obtuse, simple or sometimes forked; spores colourless, elliptical, 9-10  $\times$  5  $\mu$ .

*Clavaria inaequalis*, Berk., Outl. 282; Cke., Hdbk., n. 981; Stev., F. Brit. 297. In woods and pastures amongst grass. Scattered or in small loose tufts, clubs clavate or cylindrical, apex obtuse, sometimes forked, or variously cut at the tip now and then compressed. Distinguished from *C. fusiformis* in the tips not being apiculate and brown, 2-3 in. high.

***Clavaria argillacea.*** Fr.

Loosely tufted, simple, fragile, club-shaped, or cylindrical, from whitish to pale drab, stem yellowish; spores colourless, elliptical, 7-9  $\times$  5-6  $\mu$ .

*Clavaria argillacea*; Berk., Outl. 282; Cke., Hdbk. 982; Stev., B. Fung. 297.

Amongst moss and grass. Loosely tufted, from ¾-1½ in. high, whitish to dirty pale drab, stem pale yellow or whitish; clubs variable, clavate or cylindrical, obtuse or subacute, often more or less compressed.

***Clavaria vermicularis.*** Scop.

Densely tufted, brittle, altogether white, stuffed, simple, cylindrical, apex pointed; spores white, elliptical, 4  $\times$  3  $\mu$ .

*Clavaria vermicularis*, Cke., Hdbk., n. 984; Stev., Brit. Fung. ii. p. 298. f. xcii.

Amongst grass. Densely tufted, white, about 2 in. high, straight or sometimes flexuous.

*Clavaria fragilis*. Holmsk.

White, sometimes with a yellow tinge, loosely tufted, very brittle, simple, stuffed, becoming hollow and variously compressed, and twisted, spores white, elliptical,  $10-12 \times 4-6 \mu$ .

*Clavaria fragilis*, Berk., Outl., 283; Cke., Hdbk., n. 985; Stev., Brit. Fung. ii. p. 298.

Amongst grass. Clubs generally simple, rarely with 1 or more short branches, variously compressed, twisted or curved, soon hollow, very brittle, 1-3 in. high. Not so closely compacted as in *C. vermicularis*, and the tips not so pointed.

††† Colour smoky or blackish.

*Clavaria fumosa*. Pers.

Greyish-brown or dusky-ochre. fasciculate, fragile, soon hollow, clubs straight or flexuous, tips usually pointed and curved, very much attenuated downwards; spores colourless, elliptical,  $6-8 \times 4 \mu$ .

*Clavaria fumosa*, Cke., Hdbk., n. 986; Stev., B. Fung. ii. p. 298.

Amongst grass. Tufted, varying from smoke-brown to dingy ochre, 2-3 in. high. In Kromholtz, fig. 18, quoted by Fries under the present species; the clubs are very flexuous, tips acuminate, curved, very much attenuated below, dirty ochre, 2-3 in. high.

### III. HOLOCORYNE. Clubs almost simple, distinct at the base.

† Colour whitish.

*Clavaria canaliculata*. Fr.

Solitary, white, simple, smooth, rather tough, soon hollow, then becoming compressed, and longitudinally furrowed; spores colourless, broadly elliptical,  $10-12 \times 9-10 \mu$ .

*Clavaria canaliculata*, Fr., Hym. Eur., p. 678; Stev., Brit. Fung. ii. p. 300.

On the ground. Solitary, or sometimes in pairs, 2-4 in. high, 2-3 lines thick, longitudinally grooved, sometimes splitting, apex tapering; not rooting.

***Clavaria acuta.* Sow.**

White, solitary, simple, erect, clavate, apex acute, pruinose; spores colourless, subglobose, about  $4\ \mu$ .

*Clavaria acuta*, Sow., Fung., t. 333; Berk., Outl., p. 283; Cke., Hdbk., n. 991; Stev., Brit. Fung. ii. p. 301.

On soil in plant-pots, &c. From  $\frac{1}{4}$ - $1\frac{1}{2}$  in. high.

***Clavaria uncialis.* Grev.**

Whitish, tough, simple, smooth, obtuse, attenuated below; spores colourless, elliptical,  $5 \times 3\ \mu$ .

*Clavaria uncialis*, Grev., Scot. Cr. Fl., t. 98; Berk., Outl. 284; Cke., Hdbk., n. 992; Stev., Brit. Fung. ii. p. 301.

On dead stems of herbaceous plants, especially umbellifers. Scattered,  $\frac{1}{4}$ -1 in. high, becoming rather cartilaginous and pale amber colour when dry. Distinguished by its habitat.

†† Colour yellow or pallid, becoming darker.

***Clavaria pistillaris.* Linn. (fig. 8, p. 74.)**

Simple, clavate or obovate, stuffed, minutely velvety, whitish, then dirty yellow, finally dingy brown; spores white, elliptic-oblong,  $9-11 \times 5-6\ \mu$ .

*Clavaria pistillaris*, Cke., Hdbk., n. 987; Stev., Brit. Fung. ii. p. 299. Sow., Fung., t. 277.

In woods. Variable in size, from 4-12 in. high, 1-2 in. thick at widest part; either club-shaped with a narrow base or sometimes irregularly subglobose or broadly elliptical; flesh whitish, stuffed in the centre, that is, the texture is loose and cottony.

***Clavaria ligula.* Fr.**

Gregarious, clavate, obtuse, much attenuated downwards, base villous, simple, pale ochraceous, the clubs with rufescent tinge, stuffed; spores colourless, elliptical,  $11-13 \times 4-5\ \mu$ .

*Clavaria ligula*, Fr., Hym. Eur., p. 676; Stev., B. Fung. ii. p. 299; Fl. Dan., t. 837, f. 1.

In woods. From 2-3 in. high,  $\frac{1}{4}$  in. thick above, very obtuse at the apex, very thin and villous at the base, by which it is attached to twigs, &c. Smaller than *C. pistillaris*, and not so dark coloured, also differs in the pilose base.

***Clavaria contorta.* Holmsk.**

Erumpent; in clusters of 2-5, simple, stuffed, variously contorted and wrinkled, pruinose, yellowish, often with red or brown tinge; spores white, subglobose,  $5 \times 4$  or  $5 \mu$ .

*Clavaria contorta*, Berk., Outl. 283; Cke., Hdbk., n. 988; Stev., Brit. Fung. ii. p. 299.

On fallen branches. Easily known by its erumpent habit, that is, bursting through the bark; about 1 in. high.

***Clavaria fistulosa.* Fr.**

Simple, slender, thickened upwards, obtuse, hollow, elongated, straight, pale yellow, then rufescent; root short, villous; spores colourless, elliptical,  $14-15 \times 6-7 \mu$ .

*Clavaria fistulosa*, Fr., Hym. Eur., p. 677; Stev., Brit. Fung. ii. p. 300.

On branches, &c. Solitary or 2-3 together, 2-3 in. high,  $1\frac{1}{2}$ -2 lines thick at apex, short, distinct root villous or downy.

***Clavaria tuberosa.* Sow.**

Yellow, caespitose, or solitary, simple, straight, slightly thickened upwards, tough, base thickened, strigose, rooting; spores colourless, elliptical,  $9-10 \times 6 \mu$ .

*Clavaria tuberosa*, Sow., Fung., tab. 199; Berk., Outl., p. 284; Cke., Hdbk., n. 994; Stev., Brit. Fung., p. 300.

On decayed wood. From 2-4 in. high, 1-3 springing from a thickened, subglobose, tomentose or strigose base.

***Clavaria juncea.* Fr.**

Gregarious, very slender, elongated, flaccid, becoming hollow, apex acute, the long, creeping, stem-like base villous, pale dingy yellow, then rufescent; spores colourless, obovate or subglobose,  $4-5 \mu$ .

*Clavaria juncea*, Berk., Outl., p. 283; Cke., Hdbk., n. 990; Stev., Brit. Fung. ii. p. 300.

Gregarious on dead leaves, twigs, &c., in woods. From 3-6 in. high, 1-2 lines thick; distinguished from *C. fistulosa*

by the small, subglobose spores, longer and more slender, flaccid, acute clubs, and in the gregarious habit.

††† *Brownish or flesh-colour.*

**Clavaria Ardenia.** Sow.

Ferruginous, becoming darker, elongated, simple, thickened upwards, obtuse, hollow, base tomentose, not rooting; spores colourless, elliptical,  $14-15 \times 7-9 \mu$ .

*Clavaria Ardenia*, Sow., Fung., t. 215; Berk., Outl., p. 283; Cke., Hdbk., n. 989; Stev., Brit. Fung. ii. p. 300.

On fallen branches, &c., in woods. Varying from 5-12 in. high, and reaching  $\frac{1}{4}$  in. thick upwards; apex often acute when young, becoming obtuse and sometimes more or less hollowed out.

**Clavaria incarnata.** Weissm.

Simple, gregarious, cylindrical, apex obtuse, flesh-colour, pruinose, internally purple; spores colourless, elliptical,  $8 \times 4-5 \mu$ .

*Clavaria incarnata*, Fr., Hym. Eur., p. 678; Stev., Brit. Fung. ii. p. 301.

On the ground. Simple, varying from  $\frac{1}{4}$ - $1\frac{1}{2}$  in. high. Distinguished from *C. rosea* in the duller red colour and in being purple inside.

**PTERULA, Fr.**

Subcartilaginous, filiform, simple or densely branched, branches equal, hymenium covering every part.

*Pterula*, Fr., Linn. 1830, p. 351; Stev., Brit. Fung. ii. p. 303.

The two British species form dense tufts composed of equal, thread-like branches, distinguished amongst the *Clavaries* by the cartilaginous substance, especially when dry, and in this character agreeing with the *Tremellineae*, but distinct from the latter in the basidia producing four sterigmata at the apex, which support the spores.

**Pterula subulata.** Fr.

Tufts densely branched, branches very slender, equal, not much divided except at the tips, where they divide into

several finely-pointed branchlets, greyish-white, becoming pale amber; spores elliptical,  $8-10 \times 6-7 \mu$ .

*Pterula subulata*, Fr., Hym. Eur., p. 682; Stev., Brit. Fung. ii. p. 303.

On wood. Forming dense tufts 1-2 in. high, consisting of numerous crowded equal branches as thin as thread, becoming rather horny when dry; the branches frequently become connected by cross portions or anastomose irregularly.

*Pterula multifida*. Fr.

Usually fasciculate, several individuals forming a dense tuft; branches very numerous, thin, subequal, much divided, tips pointed, springing from a slender, more or less elongated stem-like base, rather tough, whitish, becoming pale amber and cartilaginous when dry, spores elliptical,  $10 \times 6-7 \mu$ .

*Pterula multifida*, Fr., Hym. Eur., p. 682; Stev., B. Fung., ii. p. 304.

On dead leaves, branches, &c. Tufts 1-2 in. high, composed of densely-crowded, ascending, much-divided branches as thin as a thread; base sometimes thick, at others consisting of several thin stems more or less confluent.

TYPHULA. Pers. (fig. 5, p. 74.)

Epiphytal. Club slender, cylindrical, rarely clavate; stem filiform, distinct from hymenium, often springing from a sclerotium.

*Typhula*, Pers., Syn., p. 38, emended by Fries, Epicr., p. 584.

Separated from *Clavaria* and *Pistillaria* by having the stem distinct from the hymenium. Generally minute, slender fungi in the typical species resembling the reed-mace, *Typha*, in miniature; hence the generic name.

*Typhula erythropus*. Fr. (fig. 5, p. 74.)

Simple,  $\frac{1}{2}-\frac{3}{4}$  in. high, springing from a depressed, wrinkled blackish sclerotium; stem  $\frac{1}{4}$  in. long or more, very slender, dark red; club 2-4 lines long, white, cylindrical, slender; spores  $5-6 \times 2-2.5 \mu$ .

*Typhula erythropus*, Fries, Syst. Myc. i. p. 495; Stev., Fung., p. 304.

On dead herbaceous stems. The sclerotium is sometimes absent. Fertile portion not much if at all thicker than stem.

***Typhula phacorrhiza.* Fries.**

Simple, 1-3 in. high, slender, springing from a compressed brownish sclerotium; glabrous, brownish, and often flexuous below, pallid above; spores  $8-9 \times 4-5 \mu$ .

*Typhula phacorrhiza*, Fries., Epicr., p. 585; Stev., Brit. Fung., p. 304, fig. xciv.

On dead leaves, herbaceous stems, &c. The stem is sometimes minutely velvety at the base. Fertile portion not at all thickened.

***Typhula incarnata.* Lasch.**

Whitish, more or less tinged with pink above, cylindric-clavate, 1-2 in. high, base minutely strigose, springing from a compressed brownish sclerotium; spores subglobose,  $4 \times 5 \mu$ .

*Typhula incarnata*, Lasch, in Fries' Epicr., p. 585; Stev., Fung. Brit., p. 305.

On dead herbaceous stems, &c. Slightly thickened gradually upwards, apex obtuse, rarely forked. Allied to *T. phacorrhiza*, but clearly distinguished by the form and size of the spores.

***Typhula gyrans.* Fries.**

White; stem very thin and thread-like, often gyrose, pubescent; club cylindrical, or subovate, thicker than the stem; springing from a small brownish sclerotium; spores subglobose,  $5 \times 6 \mu$ .

*Typhula gyrans*, Fries, Epicr., p. 585; Stev., Brit. Fung., p. 305.

On dead stems of grasses, &c. Whole fungus  $\frac{1}{2}-\frac{3}{4}$  in. high; stem very thin, straight or variously waved or gyrose.

*Var. Grevillei.* White, unbranched, club thickened, obtuse, stem hair-like, pubescent; not springing from a sclerotium.

*Typhula Grevillei*, Fr., Hym. Eur., p. 685; Stev., Fung., p. 305.

On dead leaves, &c.

***Typhula muscicola.* Fries.**

White, 2-3 in. high, base thin, gradually expanding into a cylindrical, obtuse club up to 2 lines in thickness; spores  $5-6 \times 3 \mu$ .



*Typhula muscicola*, Fries, Epicr., 585; Stev., Brit. Fung., p. 306.

On living mosses.

***Typhula filiformis*. Fr.**

Entire plant 1-3 in. long; stem slender, more or less branched and decumbent, brown, clubs subcylindrical, rather thicker than the stem, whitish; spores about 5-4  $\mu$ .

*Typhula filiformis*, Fries, Epicr., p. 586; Stev., Brit. Fung., p. 306.

Amongst dead leaves.

***Typhula gracilis*. Berk.**

Minute, 1-3 lines high, slender, stem short, distinct, smooth or minutely strigose; club pallid, subacute, simple, or forked; spores elliptical, 6-7  $\times$  4  $\mu$ ; cystidia numerous, large, subacute.

*Typhula gracilis*, Berk., Outl., p. 285; Stev., Brit. Fung., p. 306.

On rotten leaves.

Tip of club often acuminate.

***Typhula pusilla*. Schroet.**

White, very minute, linear, smooth; spores colourless, elliptical, 5  $\times$  3  $\mu$ .

*Typhula pusilla*, Schroeter, Schles., p. 439.

*Pistillaria pusilla*, Berk., Outl., 286; Cke., Hdbk., n. 1011; Stev., Brit. Fung. ii. p. 308.

On dead equisetum, fallen leaves, &c. Very minute, not more than 1 line high.

*Doubtful species.*

***Typhula gracillima*. White.**

White,  $\frac{1}{2}$ - $\frac{3}{4}$  in. high, very slender, curved, smooth, club elongated.

*Typhula gracillima*, White, in B. and Br., Notices of Brit. Fung., n. 1699; Stev., Fung., p. 306.

On various herbaceous plants. I have examined an authentic specimen of the above in Berkeley's herbarium at Kew, and can find no trace of basidia or hymenial surface of any kind. Glistening when dry.

***Typhula translucens.* B. & Br.**

*Typhula translucens*, B. and Br., Ann. Nat. Hist., n. 1589; Stev., Brit. Fung., p. 306.

An examination of the type specimen shows that this is not a fungus.

**PISTILLARIA. Fr. (figs. 6, 7, and 9, p. 74.)**

Small; club-shaped, either sessile or attenuated downwards as a continuous stem-like base which is not distinctly defined, becoming cartilaginous when dry.

*Pistillaria*, Fries, Hym. Eur., p. 686; Cke., Hdbk., p. 342; Stev., B. Fung. ii. p. 307.

Closely related to *Clavaria*, if indeed distinct as a genus; known by the smaller size of the species, and more especially by becoming cartilaginous and rigid when dry.

***Pistillaria tenuipes.* Mass. (figs. 6, 7, p. 74.)**

Pale drab; apex inflated, obtuse, wrinkled, stem slender, flexuous, somewhat distinct from the hymenophore; spores colourless, subglobose,  $6 \times 4-5 \mu$ .

*Clavaria tenuipes*, B. and Br., Ann. Nat. Hist., n. 369, t. 9, f. 2; Berk., Outl. 282; Cke., Hdbk., n. 983.

On bare heathy ground. Solitary or gregarious,  $\frac{3}{4}$ -1 in. high, head up to  $\frac{1}{2}$  in. across, more or less distinct from the stem; in this character the present species agrees with the genus *Pistillaria*, as also in being cartilaginous when dry.

***Pistillaria micans.* Fr.**

Rosy, shining, club-shaped, obtuse, stem short, whitish; spores white, elliptical,  $8-10 \times 4-6 \mu$ .

*Pistillaria micans*, Berk., Outl. 285; Cke., Hdbk., n. 1007; Stev., B. Fung. ii. p. 307.

On dead thistles, &c. Scattered or gregarious, about a line high, distinguished by the rose-coloured, pruinose heads.

***Pistillaria culmigena.* Fr.**

Whitish, hyaline, ovate, obtuse; stem distinct, very short; spores colourless, elliptical,  $4 \times 2-2.5 \mu$ .

*Pistillaria culmigena*, Berk., Outl. 285; Cke., Hdbk., n. 1008; Stev., Brit. Fung. ii. p. 307.

On grass stems. Scattered, very minute, not exceeding two lines in height, often smaller. Cartilaginous when dry.

**Pistillaria quisquilaris.** Fr. (fig. 9, p. 74.)

Whitish, club-shaped, often more or less compressed, and sometimes forked, soft, becoming rigid when dry, stem thin, springing from a minute sclerotium; spores cylindric-oblong, curved,  $13-15 \times 6-7 \mu$ .

*Pistillaria quisquilaris*, Berk., Outl. 286; Cke., Hdbk., n. 1009, f. 93; Stev., B. Fung. ii. p. 307.

*Clavaria obtusa*, Sow., Fung., t. 334, f. 1.

On dead fern stems, leaves, &c. Gregarious, reaching  $\frac{1}{4}$  in. high, resembling *Clavaria uncialis*, but at once distinguished by the large sausage-shaped or *allantoid* spores.

**Pistillaria furcata.** Smith.

Clubs white or yellowish, waxy, then tough, compressed, broad at the apex, attenuated downwards, generally furcate and caespitose.

*Pistillaria furcata*, Cke., Hdbk., n. 1012; Stev., Brit. Fung. ii., p. 307.

In greenhouses. Caespitose, 1-1 $\frac{1}{4}$  in. high.

**Pistillaria puberula.** Berk.

White, minute, obovate, stem distinct, thin, equal or attenuated upwards, pellucid, tomentose; spores colourless, elliptical,  $5 \times 3 \mu$ .

*Pistillaria puberula*, Berk., Outl., p. 286; Cke., Hdbk. 1010; Stev., Brit. Fung. ii. p. 308, fig. xcv.

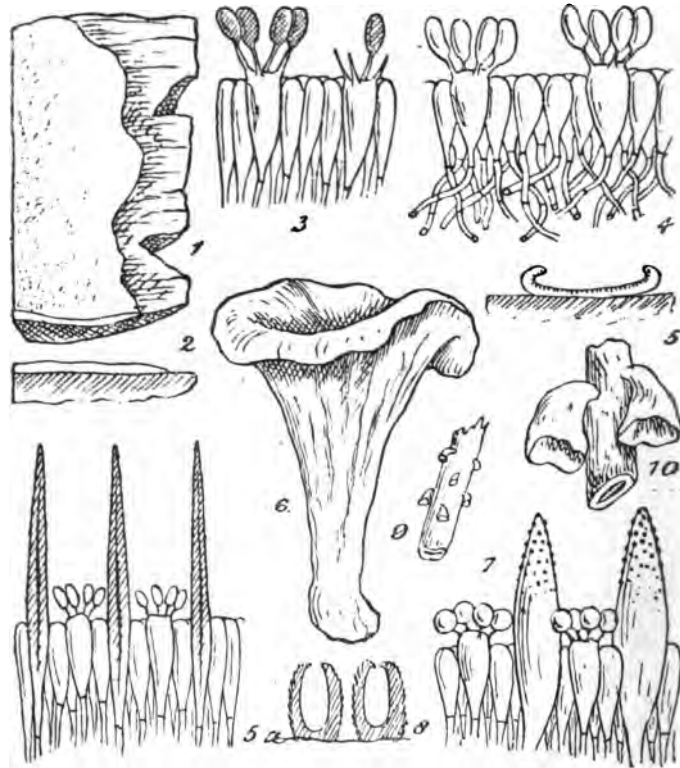
On dead bracken. Scattered, about 1 line high, distinguished from *P. quisquilaris* by its smaller size, tomentose stem, and different spores.

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## FAM. III.

## THELEPHOREAE.

In the present group we meet with a very varied collection of genera agreeing in having a well-defined hymenium, which is either perfectly even, as in *Corticium*, or at most slightly rugulose, as in *Thelephora*. The basidia are typically clavate, tetrasporous, and aseptate, thus differing from the *Tremellineae*, where the basidia are either transversely or cruciately septate, or if aseptate, deeply bifurcate and bisporous, and the whole fungus is of a gelatinous consistency when moist. In some genera included in the *Thelephoreae* the substance is more or less gelatinous, but, as stated above, the basidia are tetrasporous and aseptate. In the *Clavariaceae* the hymenium is also even, but the sporophore is always erect, either club-shaped or more or less branched. The *Tremellineae* and the *Clavariaceae* may be considered as terminal groups, in the sense of not having given origin to any of the more highly organised divisions of the *Hymenomycetes*, whereas in the *Thelephoreae* we have clearly indicated all the various types of hymenophore which respectively characterise the *Hydneae*, *Polyporeae*, and the *Agaricineae*. It must be understood that the above remarks apply to the *Thelephoreae* in its entirety and not only to the genera included in the British Flora, which are thirteen in number, whereas altogether the group contains nineteen genera. *Craterellus* connects with the *Agaricineae*, being closely allied to *Cantharellus*. *Coniophora* leads up to the *Polyporeae*, through *Merulius*. *Exobasidium* forms a transition to the *Tremellineae*. *Beccaria*, an exotic genus, connects through *Radulum* with the *Hydneae*; while *Lachnocladium*, also an exotic genus, leads up to the *Clavariaceae* through *Clavaria*. Finally the *Thelephoreae* lose the leading feature of the *Basidiomycetes*—a continuous hymenium of compacted basidia—in the genus *Heterobasidium*, which connects with the *Hymenomycetes* through the genus *Chromatosporium*.



FIGURES ILLUSTRATING THE GENERA OF THE  
*THELEPHOREAE*.

Fig. 1, *Contiophora olivacea*, portion of fungus, nat. size, growing on wood;—Fig. 2, section of same seated on wood, nat. size;—Fig. 3, section of portion of hymenium of same, showing basidia with four sterigmata, each bearing a coloured spore; between the basidia are clavate paraphyses; highly mag.;—Fig. 4, section through portion of hymenium of *Corticium*

## THELEPHOREAE.

Sporophore erect and stipitate, with a central stem, effused, with the upper portion free and reflexed, or entirely resupinate; hymenium perfectly even or radiato-rugulose, glabrous or minutely setulose with projecting cystidia; basidia normally tetrasporous; spores continuous† (aseptate), colourless or coloured.

## ANALYSIS OF THE GENERA.

A. Spores coloured.

\* Spores smooth.

**Coniophora.**—Resupinate, dry and pulverulent.

**Aldridgea.**—Resupinate, soft and subgelatinous.

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*salicinum*, showing paraphyses and basidia bearing four colourless spores each, the above elements spring directly from loosely interwoven hyphae; highly mag.;—Fig. 5, section through plant of same growing on wood, and showing the free upturned margin; nat. size;—Fig. 5A, section through portion of hymenium of *Hymenochaete rubiginosa*, showing basidia with spores, paraphyses, and long, coloured, spine-like, rigid cystidia; these last give a velvety appearance to the hymenium when examined with a pocket-lens, and constitute the leading character of the genus; highly mag.;—Fig. 6, *Craterellus cornucopioides*, a small specimen, nat. size.;—Fig. 7, section through hymenium of *Peniophora cinerea*, showing basidia bearing globose spores, paraphyses, and large colourless, projecting cystidia rough at the tip with minute particles of lime; these latter give to the hymenium a minutely hispid or velvety appearance when viewed through a pocket-lens, and constitute the leading generic character; highly mag.;—Fig. 8, section through two specimens of *Solenia anomala*; mag.;—Fig. 9, a group of specimens of *Cyphella capula*; growing on a twig; nat. size;—Fig. 10, two specimens of the same; mag.

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† In *Heterobasidium*, a transition genus between the *Thelephoreae* and the *Hyphomycetes*, the spores are septic.

**\*\* *Spores warted or echinulate.***

**Thelephora.**—Dry and fibrous, hymenium rugulose.

**Soppittiella.**—Subgelatinous, effused or variously incrusting, hymenium even.

**B. *Spores colourless.***

**\* *Parasitic on living leaves or stems.***

**Exobasidium.**—

**\*\* *Saprophytes, growing on dead wood, branches, &c.***

**† *Hymenium minutely setulose with projecting cystidia.***

**Peniophora.**—*Cystidia colourless, rough at the tip with particles of lime.*

**Hymenochaete.**—Cystidia brown, smooth.

**†† *Hymenium glabrous.***

**Corticium.**—Entirely resupinate, hymenium usually cracked when dry.

**Stereum.†**—Effuso-reflexed, pileus silky or strigose, hymenium even.

**Cladoderis.**—Horizontal and attached by a narrow point behind, hymenium radiato-rugulose.

**Craterellus.**—Large, erect, funnel-shaped.

**Cyphella.**—Minute, cup-shaped, mouth open.

**Solenia.**—Minute, cylindrical, gregarious or crowded, tubular, mouth contracted.

**‡** In certain species of *Stereum* the spores are coloured.



FIGURES ILLUSTRATING THE GENERA OF THE  
THELEPHOREAE.

Fig. 11, *Stereum ochroleucum*, showing the effused lower portion and the upper free, reflexed portion; nat. size;—Fig. 12, section of same; nat. size;—Fig. 13, *Stereum Sowerbei*, a small specimen, showing a mesopod form; nat. size;—Fig. 14, section through the hymenium of *Stereum*  
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## CONIOPHORA, D.C. (emended). (figs. 1-3, p. 94.)

Broadly effused, adnate; margin defined or indeterminate; hymenium without cystidia, when mature powdered with the smooth, coloured spores.

*Coniophora*, D.C., Flor. Fr. vi. p. 34; Mass., Mon. Thel., p. 128.

*Corticium*, sub-gen. *Coniophora*, Pers., Myc. Eur., p. 153; Fries, Hym. Eur., p. 657; Oke., Grev. v. 8, p. 88.

The species constituting the present genus usually form broadly expanded patches on dead wood or bark, agreeing in this respect with the species of *Corticium* and *Peniophora*, but readily distinguished by the coloured spores. In some species of *Hymenochaete* the spores are coloured, but the hymenium bristles with projecting coloured spines or cystidia, which give to the surface a velvety appearance under a pocket-lens. In the genus *Thelephora*, again, the spores are generally coloured, but rough with minute warts, and the hymenium has a tendency to become uneven, whereas in *Coniophora* the hymenium is even, but may appear to be nodulose or irregular when very thin, and following the inequalities of the matrix. The leading features of the present genus are, the close attachment of every portion of the fungus to the substratum, and the even, smooth hymenium powdered with the smooth, coloured spores.

The species are closely allied, and represent a very primitive type of the *Basidiomycetes*; the hymenium is uppermost, and there is no tendency shown by any one species to depart

*purpureum*, showing the elements of the hymenium—basidia and paraphyses—springing from a densely compacted stratum of hyphae, below which there is a layer of loosely interwoven mycelium; the presence of this dense subhymenial layer is an important morphological distinction between *Stereum* and the allied genus *Corticium*; highly mag.;—Fig. 15, *Cladoderis minima*; nat. size;—Fig. 16, a single specimen of same; slightly mag.;—Fig. 17, spores of same; highly mag.;—Fig. 18, *Soppitiella cristata*; nat. size;—Fig. 19, basidium and spores of same; highly mag.;—Fig. 20, *Aldridgea gelatinosa*, portion of a specimen; nat. size;—Fig. 21, basidium and spores of same; highly mag.;—Fig. 22, *Exobasidium vacinii*, showing the bullate patches formed by the fungus on the leaves of *Vaccinium myrtillus*; nat. size;—Fig. 23, portion of the under side of *Thelephora laciniata*, showing the rugose hymenium and lacinate margin; nat. size;—Fig. 24, basidium and spores of same; highly mag.

from this primitive condition, as usually first indicated by the margin becoming free and more or less elevated.

**Coniophora olivacea.** Mass. (figs. 1-3, p. 94.)

Membranaceous, inseparable, margin byssoid, whitish; hymenium olive, glistening with crystals, pulverulent, sometimes cracked; spores elliptical, ochraceous-olive,  $14-17 \times 10-12 \mu$ .

*Coniophora olivacea*, Mass., Mon. Thel., p. 129.

*Corticium olivaceum*, Stev., Brit. Fung. ii. p. 283.

On decaying pine-trunks. Broadly effused, often covering nearly the whole surface of fallen trunks. The glistening appearance of the hymenium, due to minute crystals, is very evident in fresh specimens, but disappears on drying. Hymenium ochraceous-olive, or brownish when dry, sometimes cracked; margin pale, byssoid, or altogether indeterminate. Superficially resembling *Periophora olivacea*, but distinguished by coloured spores and absence of cystidia.

**Coniophora arida.** Karst.

Membranaceous, very thin, not removable from the matrix, broadly effused, margin fibrillose whitish; hymenium continuous, even, dingy sulphur or ochraceous, pulverulent, becoming brownish; spores ellipsoid with a minute apiculus at the base, ochraceous,  $11-12 \times 6-7 \mu$ .

*Coniophora arida*, Mass., Mon. Thel., p. 132; Karst., Myc Fenn., p. 319.

*Corticium aridum*, Stev., Brit. Fung. ii. 282.

On decaying pine-wood. Often broadly effused, entire fungus closely agglutinated, dry and powdery when mature, varying from almost clear sulphur-yellow to brownish-ochre, becoming dusky when old and dry; margin radiato-byssoid, whitish. Spore measurements will distinguish the present from closely allied species.

**Coniophora sulphurea.** Mass.

Broadly effused, margin bright sulphur-yellow, often fibrillose and running out in cord-like radiating strands; hymenium thick, compact, almost waxy, brownish with yellow tinge, cracking when dry; spores broadly elliptical, brownish-yellow,  $11-12 \times 8-10 \mu$ .

*Coniophora sulphurea*, Mass., Mon. Thel., p. 132.

*Corticium sulphureum*, Berk., Outl., p. 274; Cke., Hdbk., n. 929; Stev., Brit. Fung. ii. 276.

On wood, bark, and leaves. Often broadly effused, the hymenium is not usually perfect, being spongy, bright coloured, and barren, or with only patches here and there producing basidia.

*Var. ochroidea*. Berk.

Hymenium ochraceous; spores elliptical with a minute apiculus at the base, olive,  $16-18 \times 9-10 \mu$ .

*Coniophora sulphurea*, var. *ochroidea*, Mass., Mon. Thel., p. 133.

On wood and bark. In general structure and habit the variety agrees with the typical form, differing in the ochraceous tint of the hymenium and the larger elliptical spores. May possibly prove to be a distinct species.

*Coniophora ochracea*. Mass.

Very broadly effused, submembranaceous, usually indeterminate; hymenium pulverulent, whitish then ochraceous; spores yellowish, subglobose,  $8 \times 6-7 \mu$ .

*Coniophora ochracea*, Mass., Mon. Thel., p. 137.

Spreading continuously as a thin inseparable film over the inside of elm-bark which had become partly detached from the fallen trunk. In its most highly developed condition presenting some resemblance to *Coniophora sulphurea*, from which it is distinguished by the smaller subglobose spores, and indeterminate margin. The subhymenial hyphae are very thick, measuring up to  $18 \mu$  in diameter, and are pale yellow.

*Coniophora subdealbata*. Mass.

Effused, determinate, thin; hymenium ochraceous olive, pulverulent at maturity; spores elliptical with a minute basal apiculus, ochraceous,  $11-12 \times 7-8 \mu$ .

*Coniophora subdealbata*, Mass., Mon. Thel., p. 135.

*Corticium subdealbatum*, B. & Br., Grev.

On bark and wood. Thin, often broadly effused, ochraceous-olive, hymenium pulverulent, often with paler barren patches.

*Coniophora pulverulenta*. Mass.

Broadly effused, margin thin, byssoid, whitish; hyme-

nium rusty-brown, pulverulent, even, entire; spores elliptical, yellow-brown,  $14-15 \times 9-10 \mu$ .

*Coniophora pulverulenta*, Mass., Mon. Thel., p. 129.

*Telephora pulverulenta*, Lév., Ann. Sci. Nat., sér. iii., vol. v. p. 149 (1846).

On wood. The rusty-brown or sometimes dark brown hymenium, white byssoid margin, and large spores characterise the present species.

***Coniophora Cookei*. Mass.**

Effused, fibrilloso-membranaceous, margin byssoid, whitish; hymenium olive with a rusty tinge, even, pulverulent; spores elliptic, ochraceous,  $9-11 \times 6 \mu$ .

*Coniophora Cookei*, Mass., Mon. Thel., p. 136.

On rotting wood. Closely resembling externally *Corticium lazum*, Fr., but this species, as proved by a specimen from Fries in the Berkeley collection, Kew, No. 3655, is a true *Telephora*.

***Coniophora membranacea*. D.C.**

Broadly effused, subrotund, thin, fragile when mature, separable from the matrix, margin minutely fibrillose, yellowish; hymenium minutely pulverulent, pallid then dirty pale feruginous; spores elliptical, yellow-brown,  $10-15 \times 5-6 \mu$ .

*Coniophora membranacea*, Mass., Mon. Thel., p. 137.

On wood, walls, &c. Forming broadly expanded, thin patches often a foot or more in diameter, becoming cracked and peeling off in shreds when dry.

***Coniophora umbrina*. Mass.**

Effused, adnate, soft and fleshy at first, margin radiatovillose, umber; hymenium tuberculose, then irregularly contracted during drying, rusty-umber, spores elliptical with a minute apiculus at the base, pale umber,  $12-14 \times 8-10 \mu$ .

*Coniophora umbrina*, Mass., Mon. Thel., p. 131.

*Corticium umbrinum*, Stev., Brit. Fung., vol. ii. p. 282.

On wood, branches, twigs, and on the ground. Rather thick and fleshy, irregular, incrusting various substances.

***Coniophora cinnamomea*. Mass.**

Commencing as isolated patches, which soon become confluent and form a broad, irregularly effused patch, with a

coarsely fibrillose margin; hymenium fleshy, dingy cinnamon, cracked when dry; spores elliptical with a minute basal apiculus, pale cinnamon,  $11-12 \times 7-8 \mu$ .

*Coniophora cinnamomea*, Mass., Mon. Thel., p. 130.

*Corticium cinnamomeum*, Stev., Brit. Fung. ii. 276.

On wood and bark. Fleshy and rather soft, becoming cracked during drying, sometimes dingy brown. Superficially resembling dark forms of *Peniophora velutina*, but distinguished by the coloured spores and absence of cystidia.

***Coniophora incrustans*. Mass.**

Effused, indeterminate, inseparable; hymenium pale ochraceous or dirty white, pulverulent; spores elliptical, very pale ochraceous,  $15-17 \times 8-10 \mu$ .

*Coniophora incrustans*, Mass., Mon. Thel., p. 132.

Running over leaves, twigs, &c. Usually forming a thin inseparable film; when perfectly developed the hymenium is compact and almost waxy in consistence, but pulverulent with the mass of spores.

***Coniophora Berkeleyi*. Mass.**

Effused, determinate, thick; hymenium becoming much cracked, interstices silky, yellow-brown, assuming a purple tinge with age; spores ellipsoid with a minute apiculus at the base, yellow-brown,  $11-12 \times 6-7 \mu$ .

*Coniophora Berkeleyi*, Mass., Mon. Thel., p. 135.

On decorticated wood. Very thick and compact for a *Coniophora*, hymenium becoming much cracked owing to contraction during drying; the margin is sometimes minutely byssoid. Superficially resembling *Corticium lactescens*, Berk., but readily distinguished by the coloured spores.

***Coniophora puteana*. Mass.**

Broadly effused, rather thick, separable, margin minutely byssoid, whitish; hymenium dirty yellow, becoming olive-brown, pulverulent, sometimes cracked; spores brownish-olive,  $14-16 \times 8-9 \mu$ .

*Coniophora puteana*, Mass., Mon. Thel., p. 129.

*Corticium puteanum*, Stev., Brit. Fung. 281.

On bark and wood. Effused, rather thick, waxy when young, sometimes separable as a thick, tough membrane.

**ALDRIDGEA.** Mass. (nov. gen.) (figs. 20, 21, p. 97.)

Resupinate, effused, fleshy, subgelatinous when growing, cartilaginous or rigid and collapsed when dry; hymenium smooth, even; basidia tetrasporous; spores continuous, coloured, smooth.

Allied to *Coniophora* in the large coloured spores, but distinguished by the subgelatinous consistency when growing.

Named after Miss Emily Aldridge, a Sussex mycologist.

**Aldridgea gelatinosa.** Mass. (figs. 20, 21, p. 97.)

Broadly effused, rather fleshy, subgelatinous, pallid, becoming collapsed, rigid, and purple-brown when dry, margin determinate; spores broadly elliptical, obliquely apiculate, olive, smooth,  $10 \times 6-7 \mu$ .

On sawdust. Extending for several inches, the irregularities of the hymenium being due to the substratum.

**THELEPHORA.** Ehrh. (emended). (figs. 23, 24, p. 97.)

Mesopod or dimidiate with the hymenium inferior, or resupinate with the hymenium exposed to the light; pileus coriaceous, destitute of a distinct cuticle, usually fibrillose; hymenium even or generally rugulose; basidia tetrasporous, spores continuous, spherical, coloured, minutely warted or echinulate.

*Thelephora*, Ehrh., Crypt., p. 178; emended in Massee, Monogr. Theleph.

The genus as defined above contains a considerable number of species scattered over the globe, characterised by the loose, fibrillose texture of the pileus, the usually rugulose hymenium, and the coloured, sub-globose, minutely-warted spores. Brown, with a vinous or purple tinge is the predominating colour. Many of the species are soft and pliant when growing, but never gelatinous.

\* *Growing erect, stipitate or sessile, frequently deeply cut or lacinate.*

**Thelephora anthocephala.** Fr.

Rusty-brown, inodorous, villose, cut into wedge-shaped

segments with whitish, fringed tips; hymenium almost even; spores subglobose, vinous, verruculose, 8-9  $\mu$ .

*Thelephora anthocephala*, Berk., Outl., 267, t. 17, f. 4; Cke., Hdbk. n. 893; Stev., Brit. Fung., 263.

On the ground in woods. Tufted, 1-2 in. high, often cut to the base into wedge-shaped segments, or the segments very narrow and branched. There is often a vinous tinge about the lower portion of the segments.

***Thelephora caryophyllea*. Pers.**

Brownish-purple, inodorous, stem short, pileus depressed, margin variable, lobed or cut into narrow segments; hymenium almost even; spores globose, warted, brown, 7-8  $\mu$ .

*Thelephora caryophyllea*, Berk., Outl., 267; Sound. and Sm. t. 41, f. 2; Cke., Hdbk., n. 894; Stev., Brit. Fung., ii. 262.

On the ground amongst grass, under trees. Tough, 2-3 in. high, pilei usually densely caespitose, cup-shaped with a central stem or very much cut and irregular.

***Thelephora clavularis*. Fr.**

Reddish-brown with vinous tinge, soft, branches very irregular, crowded, rounded or subcompressed, smooth, pruinose, tips acute, whitish, downy; stem very short, sub-tuberosus; spores subglobose, vinous, warted, 8  $\times$  6-7  $\mu$ .

*Thelephora clavularis*, Fr., Hym. Eur. 634; Stev., B. Fung. 263.

On the ground. Branches densely fasciculate, rounded or compressed, ending in one or more whitish, pubescent, acute tips; 1-1½ in. high.

***Thelephora palmata*. Fr.**

Foetid; brownish-purple, soft, divided from the stem-like base into numerous flattened, palmately-branched segments, tips whitish, fringed; spores subglobose, vinous, warted, 8-11  $\mu$ .

*Thelephora palmata*, Fr., Berk., Outl., p. 267; Cke., Hdbk., n. 895; Stev., B. Fung. 263.

On the ground in woods. Forming dense clusters 1-2½ in. high, distinguished by the foetid odour and wedge-shaped branches.

**Thelephora intybacea.** Pers.

Caespitose, soft, whitish, then reddish-brown; stems more or less confluent; pileoli imbricated, fibrous, margin expanded, whitish, becoming dark; hymenium papillose, spores subglobose, rough, vinous, 7-9  $\mu$ .

*Thelephora intybacea*, Fr., Hym. Eur. 635; Stev., B. Fung. ii. 264.

On the ground. Tufts 1½-2 in. high, erect or with laterally spreading, subtriangular pilei from 1-2 in. across.

**\*\* Pilei imbricated, horizontal.**

**Thelephora terrestris.** Ehrh.

Tufted, soft, brown, then blackish; pileoli overlapping, flattened, more or less circular in outline, strigose; hymenium radiato-rugose; spores subglobose, vinous, warted, 8-10.

*Thelephora terrestris*, Berk., Outl., p. 267; Cke., Hdbk., n. 896; Stev., B. Fung. 264.

On the ground in fir woods. Variable in size, segments sometimes subdivided, from 1-2 in. across.

**Thelephora laciniata.** Pers. (figs. 23, 24, p. 97.)

Vinous, brown, soft, incrusting, lobes thin, overlapping, subrotund, fibroso-scaly, margin coarsely fibrose, at first whitish; hymenium inferior, radiato-rugulose, papillose; spores subglobose, vinous, rough, 6-9  $\mu$ .

*Thelephora laciniata*, Berk., Outl. p. 268; Cke., Hdbk., n. 899; Stev., B. F. ii. p. 264.

On fir-stumps, running up stems of heather, &c., and on the ground in fir-woods. Perennial. Variable in size, often extending for several inches. Known from *T. terrestris* by the coarsely fibrous pileus and the shaggy margin.

**Thelephora biennis.** Fr.

Greyish-brown or ochraceous, sometimes with a vinous tinge, soft, incrusting; pilei tomentose with the fringed margin often reflexed; hymenium almost even; spores subglobose, rough, vinous, 9-11  $\mu$ .

*Thelephora biennis*, Berk., Outl., p. 268; Cke., Hdbk. 900; Stev., B. F. ii. 264.

On the ground, stones, wood, &c. Often broadly effused, incrusting everything near, pale ochraceous, greyish-brown



or vinous, the pilei are sometimes rudimentary, at others well developed, with free reflexed margins. Known from *T. terrestris* by the even, not radiato-rugulose hymenium and from *T. laciniata* by the tomentose and not coarsely fibrillose pileus.

***Thelephora mollissima*. Pers.**

Whitish, becoming tinged brown, incrusting, very soft, either continuous or cut up into spreading, acute-pointed segments; hymenium almost even, smooth, vinous-brown; spores subglobose, rough, vinous, 7-9  $\mu$ .

*Thelephora mollissima*, Berk., Outl., p. 263, t. 17, f. 5; Cke., Hdbk., n. 898; Stev., B. Fung. ii. p. 265.

On the ground, twigs, &c., in woods. Sometimes forming broadly effused, irregular incrusting masses without distinct pilei; at others erect and as much cut up as *T. palmata*. Very soft.

**SOPPITTIELLA. Mass. (figs. 18, 19, p. 97.)**

Effused or variously incrusting, soft, fleshy, and subgelatinous when growing, collapsing when dry; hymenium smooth, naked; basidia tetrasporous; spores subglobose, echinulate, continuous, coloured; cystidia absent.

The present genus is established for the reception of certain species previously included in *Thelephora*, from which it differs in being soft and subgelatinous when moist, and compact, not strigose pileus; forming either effused patches or dendritic masses on twigs, grass, &c.

The genus is named after Mr. H. T. Soppitt, a Yorkshire mycologist.

***Soppittiella sebacea*. Mass.**

Whitish at first, fleshy, soft, then becoming rigid, incrusting, form very variable; hymenium collapsing when dry and often more or less tinged brown or cinnamon; spores subglobose, spinulose, vinous, 9-10  $\mu$  diameter; basidia tetrasporous.

*Thelephora sebacea*, Berk., Outl., p. xvii. t. 17, f. 6; Cke., Hdbk., n. 904.

On stumps, twigs, grass, &c. Variously incrusting,

forming very irregular stalactitic or tuberculose crust-like patches. White, soft, and fleshy when growing. Smell none.

The present species has nothing in common with *Sebacinia incrustans*, Tul., Ann. Sci. Nat. (1872), t. x. f. 5-10.

**Soppittiella caesia.** Mass.

Effused, thin, soft, bright grey, determinate; inseparable; spores subglobose, spinulose, vinous,  $10\ \mu$  diameter.

*Thelephora caesia*, Persoon, Obs. Myc. i. t. 3, f. 6. On wood, moss, &c., on the ground. Forming thin, determinate patches 1-4 or 5 in. across, soft and almost subgelatinous when growing, hymenium not cracked when dry; hyphae brownish. Superficially resembling a thin soft *Corticium*, but with the pale vinous or brownish echinulate spores of the present genus. The present species requires to be carefully distinguished from *Peniophora Crosslandi*, which, under a pocket-lens is minutely setulose with the white, projecting cystidia.

**Soppittiella fastidiosa.** Mass.

White, broadly effused, incrusting, shapeless or forming irregularly flattened branches, very foetid; hymenium papillose becoming rufescent; spores elliptical, rough, almost colourless,  $6-7 \times 4-5\ \mu$ .

*Thelephora fastidiosa*, Berk., Outl., p. 268; Cke., Hdbk. 901; Stev., Brit. F. 265.

On the ground, leaves, &c. White becoming cream-coloured, running as a thin film, over everything in its way, sometimes passing into free, flattened branches. Distinguished from *T. cristata* by its disagreeable odour. Silky and byssoid when young.

**Soppittiella cristata.** Mass. (figs. 18, 19, p. 97.)

Pallid, incrusting, rather tough, here and there passing into irregular branches with awl-shaped or fringed tips; hymenium papillose; spores subglobose, rough, pale vinous,  $7-8 \times 6\ \mu$ .

*Thelephora cristata*, Fr., Berk., Outl., p. 268; Sow., t. 158; Cke., Hdbk. 897; Stev., Brit. F. 265.

On the ground, or incrusting leaves, mosses, &c. Very variable, forming thin, paint-like patches running over

leaves, twigs, &c., or passing into cristate ascending branches  $\frac{1}{2}$ –1 in. high. Not byssoid and silky when young.

**Soppittella crustacea.** Mass.

Umber-brown with sometimes a purple tinge, broadly incrusting, rather fleshy, margin fibrillose, whitish; hymenium irregularly papillose; spores globose, rough, vinous-brown, 9–11  $\mu$ .

*Thelephora crustacea*, Fr., Hym. Eur. 637; Stev., Brit. Fung. 266.

Running over the ground, moss, &c. Distinguished by the brown colour and white fibrillose margin; sometimes effused in an irregular manner for several inches.

**EXOBASIDIUM.** Woronin. (fig. 22, p. 97.)

Parasitic on living plants, leaves more especially, which in consequence become variously deformed; basidia crowded, cylindric-clavate, tetrasporous; spores elliptic-oblong, often unequilateral, continuous, colourless.

*Exobasidium*, Woronin, in Verhandl. Nat. Ges. Freib. iv. fasc. iv. (1867); Sacc., Syll. vi. p. 664.

A very peculiar and anomalous genus, the vegetative hyphae remain immersed in the root, the basidia, which are closely packed and form a hymenium, being alone developed on the surface. Most nearly allied to *Corticium*, but distinguished by being a true parasite.

**Exobasidium vaccinii.** Woronin. (fig. 22, p. 97.)

Innate, effused, form various, usually orbicular or elongated, fleshy, often becoming confluent; hymenium protruding from the under surface of the leaves or the stem, flesh-coloured with a white bloom; spores elongato-fusoid, colourless, straight, 5–8  $\times$  1–2  $\mu$ .

*Exobasidium vaccinii*, Woronin, in Nat. Ges. Z. Freib. b. iv. Heft iv.; Sacc., Syll. vi. n. 7795.

On living leaves, rarely on stems and petioles of *Vaccinium myrtillus*. Red or purple patches occur on the upper surface of the leaves opposite to the portion occupied by the fungus below. The fungus occurs on other species of *Vaccinium*, also on species of *Andromeda* and *Acrostaphylos* in various parts of Europe.

**Exobasidium rhododendri.** Cramer.

Forming gall-like, bullate excrescences, that are at first pale, then reddish and shining,  $\frac{1}{2}$ –1 in. across, on the under surface of the leaves, also on the petioles and stems; spores  $7-8 \times 3 \mu$ , often slightly curved.

*Exobasidium rhododendri*, Cramer, in Rab., Fung. Eur., n. 1910; Sacc., Syll. vi. n. 7797.

On the leaves and twigs of *Rhododendron ferrugineum* and other species.

**PENIOPHORA.** Cooke. (fig. 7, p. 94.)

Entirely adnate or with the margin free and more or less elevated; hymenium even, furnished with projecting, fusiform, colourless cystidia, which are covered with minute particles of oxalate of lime; spores colourless.

*Peniophora*, Cke., Grev., v. viii. p. 20; Mass., Mon. Thel., p. 140, pl. xlviii. figs. 14–19.

The species constituting the present genus were formerly included in the old genus *Corticium*. The leading idea of the genus *Peniophora* consists in the presence of numerous projecting cells which give to the hymenium a minutely velvety appearance when seen under a pocket-lens. These projecting cells were called *metuloids* by Cooke, but they are evidently homologous with the bodies called *cystidia* by the old mycologists. In the present genus the cystidia are unicellular, colourless, more or less fusiform and with the portion projecting above the surface of the hymenium studded with numerous minute particles of oxalate of lime. While constituting an excellent generic character, cystidia are variable in size in the same species, and even in the same specimen, the measurements given refer to the length above the surface of the hymenium and width at the widest part, and represent the average size. In old specimens the cystidia often break away, leaving the surface of the hymenium glabrous, but the persistent bases can always be seen in a section under the microscope.

**A. Margin free, more or less upturned.****Peniophora quercina.** Cooke.

Subcartilaginous, at first adpressed, the margin eventually

becoming more or less involute, under surface smooth, blackish; hymenium reddish-lilac; cystidia fusoid,  $50-70 \times 15-20 \mu$ ; spores elliptic-oblong, slightly curved,  $12-14 \times 5 \mu$ .

*Peniophora quercina*, Cooke, Grev., viii. p. 20, pl. 125, f. 13; Mass., Mon. Thel., p. 141.

*Corticium quercinum*, Fr., Epicr. 563; Cke., Hdbk., n. 936; Stev., Brit. Fung. ii. 278; Grev., Scot. Cr. Fl., t. 142; Berk., Outl., p. 275.

On branches, especially oak. Variable in size, sometimes  $\frac{1}{4}-\frac{1}{2}$  in. across with the margin upturned and attached by a central point, at others extending for several inches, appanate with the extreme edge only free. Hymenium varying from flesh-colour to lilac, when old often slate-colour.

#### *Peniophora pezizoides*. Mass.

Eruptent; subcoriaceous, at first cup-shaped, then expanded, outside pale, villose; hymenium ochraceous, minutely velvety; cystidia fusoid,  $50-60 \times 15-20 \mu$ ; spores globose,  $4-5 \mu$ .

*Peniophora pezizoides*, Mass., Mon. Thel., p. 141, pl. xlvii. figs. 17-19.

On branches of horse-chestnut. Bursting through the bark, attached by a central point, at first with the margin strongly involute, becoming expanded; from  $\frac{1}{4}-\frac{3}{4}$  in. across. Allied to *Peniophora quercina*, but distinguished by the small globose spores and the pale villous exterior.

#### *Periophora gigantea*. Mass.

Very broadly effused, margin free, strigose; substance rather fleshy, when dry cartilaginous; hymenium minutely velvety, whitish, becoming tinged with brown when old; cystidia fusoid,  $50-60 \times 15-25 \mu$ ; spores elliptical,  $9-10 \times 5-6 \mu$ .

*Periophora gigantea*, Mass., Mon. Thel., p. 142.

*Corticium giganteum*, Berk., Outl., p. 272; Cke., Hdbk., n. 922; Stev., Brit. Fung. 274.

On fir bark and wood, leaves, &c. Often broadly effused, forming patches a foot or more in extent, when young and moist rather soft and fleshy, becoming thin and cartilaginous when dry; hymenium at first almost white, becoming tinged

with brown or lilac. In old specimens the cystidia fall away, leaving the hymenium smooth.

*B. Margin adpressed, often indeterminate.*

***Peniophora limitata.* Cooke.**

Subrotund, closely adnate, firm and rather thick, margin black; hymenium dirty ochraceous, becoming pale, minutely velvety; cystidia fusoid,  $30-40 \times 15-20 \mu$ ; spores elliptic-oblong, with a minute apiculus at the base, slightly curved,  $20-22 \times 6 \mu$ .

*Peniophora limitata*, Cke., Grev. viii. p. 21, pl. 123, f. 7; Mass., Mon. Thel., p. 145.

*Corticium limitatum*, Stev., Brit. Fung. ii. 280.

On bark and wood. Well marked by the dingy, pale hymenium being circumscribed by a well-defined black margin.

***Peniophora rosea.* Mass.**

Broadly effused, thin, closely adnate, margin fimbriate, whitish; hymenium rosy, becoming pale, minutely velvety, often cracked when dry; cystidia fusoid,  $40-60 \times 18-25 \mu$ ; spores elliptic-oblong, curved,  $13-15 \times 4-5 \mu$ .

*Peniophora rosea*, Mass., Mon. Thel., p. 146.

*Corticium roseum*, Berk., Outl., p. 273; Cke., Hdbk., n. 926; Stev., Brit. Fung. ii. 275.

On wood and bark. Sometimes in small scattered patches, but usually broadly effused, clear rose-pink with a white byssoid margin when fresh, when dry pale ochraceous with traces of pink only.

***Peniophora incarnata.* Mass.**

Inseparable, rather waxy when fresh, margin byssoid, or altogether indeterminate; hymenium reddish or orange, not becoming pale, minutely velvety; cystidia fusoid,  $25-30 \times 12-18 \mu$ ; spores elliptic-oblong, curved,  $18-20 \times 5-6 \mu$ .

*Peniophora incarnata*, Mass., Mon. Thel., p. 147.

*Corticium incarnatum*, Cke., Hdbk., n. 938; Stev., Brit. Fung. ii. 227.

On wood and bark. Often broadly effused, closely adglutinated, hymenium usually becoming dull orange with age, but never becoming colourless, as in *P. roseum*. When old

the cystidia fall away, leaving the hymenium glabrous, but the microscope always reveals their presence.

***Peniophora ochracea*. Mass.**

Broadly effused, inseparable, margin radiato-byssoid, soon disappearing; hymenium ochraceous, sparkling with minute crystals of lime when fresh, cracked when dry; cystidia fusoid,  $40-50 \times 20 \mu$ ; spores elliptical,  $10 \times 5 \mu$ .

*Peniophora ochracea*, Mass., Mon. Thel., p. 150.

*Corticium ochraceum*, Fr., Epicr. 563; Cke., Hdbk., n. 635; Berk., Outl., p. 274; Stev., B. Fung. ii. 378.

On bark and wood. Closely resembling in general habit, colour, and in presence of sparkling atoms on the hymenium, *Coniophora olivacea*, but distinguished by the cystidia and smaller colourless spores.

***Peniophora cinerea*. Cooke. (fig. 7, p. 94.)**

Commencing as isolated rounded patches, which usually become confluent, forming broadly effused patches, rigid; hymenium ashy or with brown tinge, margin similar; cystidia fusoid,  $30-50 \times 15-20 \mu$ ; spores globose,  $5-7 \mu$ .

*Peniophora cinerea*, Cke., Grev. viii. p. 20, pl. 123, f. 8; Mass., Mon. Thel., p. 148.

*Corticium cinereum*, Berk., Outl., p. 275; Cke., Hdbk., n. 937; Stev., Brit. F. ii. 279.

On bark and wood, especially ash. Often commencing as detached, circular patches of a brownish colour, these usually soon grow into each other, forming irregular patches, sometimes extending for several inches. The hymenium is minutely velvety, and varies from brownish-grey, through lead-colour to greyish-lilac when dry.

***Peniophora velutina*. Cooke.**

Broadly effused, rather fleshy, inseparable, margin running out into long branching strands; hymenium velvety, cream colour, often slightly tinged with pink or buff; cystidia cylindrical or attenuated upwards,  $60-80 \times 10-15 \mu$ ; spores elliptic with a minute apiculus,  $10 \times 5 \mu$ .

*Peniophora velutina*, Cke., Grev. viii. p. 21, pl. 125, f. 15; Mass., Mon. Thel., p. 152.

*Corticium velutinum*, Berk., Outl., p. 273; Cke., Hdbk., n. 927; Stev., Brit. F. ii. 275.

On wood and bark. When perfectly developed, the hymenium bristles with cystidia, which are more cylindrical and less incrustated with lime than usual. In some specimens the hymenium is very much cracked, in others quite continuous. The marginal radiating strands of mycelium often extend for many inches and connect several fertile patches.

***Peniophora rimosa.* Cooke.**

Broadly effused, inseparable, margin indeterminate; hymenium ochraceous, when dry cracked, minutely velvety, cystidia scattered or in clusters, fusoid,  $70-100 \times 15-18 \mu$ ; spores elliptic-oblong, slightly curved,  $15-17 \times 6 \mu$ .

*Peniophora rimosa*, Cke., Grev., ix. p. 94; Mass., Mon. Thel., p. 153.

On bark and wood. Very closely resembling cracked forms of *Peniophora velutina*, from which it differs in the larger spores. The hymenium is usually cracked into numerous irregular polygonal portions.

***Peniophora Scotica.* Mass.**

Broadly effused, margin fibrillose, radiating; hymenium pale cinnamon, minutely velvety; cystidia sub-cylindrical,  $90-120 \times 15-20 \mu$ ; spores elliptical,  $8-10 \times 6-7 \mu$ .

*Peniophora Scotica*, Mass., Mon. Thel., p. 152.

Broadly effused over the inside of bark. Closely related to *Peniophora velutina*, differing in colour and absence of the radiating marginal strands of mycelium, the cystidia are also larger in the present species.

***Peniophora phyllophila.* Mass.**

Broadly effused, membranaceous, margin fibrillose, often indeterminate; hymenium cream-colour, continuous, cystidia fusoid or cylindrical, with the apex sometimes thickened,  $60-80 \times 20-30 \mu$ ; spores elliptic.  $12 \times 6 \mu$ .

*Peniophora phyllophila*, Mass., Mon. Thel., p. 150.

On dead leaves. Closely resembling in habit and colour *Corticium epiphyllum*, P., but distinguished by the numerous cystidia.

***Peniophora pubera.* Mass.**

Broadly effused, thin, inseparable, indeterminate, hymenium whitish or dirty pale buff, minutely velvety, cracked when



dry; cystidia cylindrico-fusoid,  $80-120 \times 15-20 \mu$ ; spores elliptic-oblong,  $10-12 \times 4 \mu$ .

*Peniophora pubera*, Mass., Mon. Thel., p. 149.

*Corticium puberum*, Stev., Brit. Fung. 277.

On bark and wood. Often very broadly effused, margin usually altogether indeterminate. Accompanying the typical cystidia are elongated, hair-like bodies.

***Peniophora terrestris*. Mass.**

Effused, very thin, indeterminate; hymenium pale grey or buff, velvety, cystidia cylindrico-fusoid,  $80-90 \times 15-20 \mu$ ; spores elliptical,  $10 \times 6-7 \mu$ .

*Peniophora terrestris*, Mass., Grev. xv. p. 107; Mass., Mon. Thel., p. 153.

Running over branches, leaves, and the naked ground. Forming pale grey or buff patches, resembling a mould in appearance.

*Sub-gen. SCOPULOIDES. Cystidia arranged in fascicles.*

***Peniophora hydnoides*. Cke. & Mass.**

Broadly effused, indeterminate, subinnate; hymenium grey, setulose; cystidia cylindrico-fusoid, aggregated in clusters,  $70-120 \times 12-14 \mu$ ; spores globose,  $4-5 \mu$ .

*Peniophora hydnoides*. Cke. and Mass., Mon. Thel., p. 154, pl. xlvii., figs. 15, 16.

On bark. Resembling under a pocket-lens several of the adnate species of *Hydnum* and *Grandinia*, but on microscopic examination the spine-like projections on the hymenium are seen to consist of clusters of typical cystidia.

**HYMENOCHAETE. Lév. (fig. 5A, p. 94.)**

Sporophore entirely resupinate, effuso-reflexed, or entirely free from the matrix and furnished with a central stem; hymenium minutely velvety with rigid, smooth, coloured, projecting cystidia (setae); basidia tetrasporous; spores continuous, hyaline or coloured.

*Hymenochaete*, Lévaille, Ann. Sci. Nat., ser. 3, p. 150; Mass., Mon. Thel., p. 95.

A well-marked genus, characterised by having the

hymenium studded with projecting, smooth, thick-walled, coloured, sharp-pointed cystidia (or setae), which are undoubtedly modified cystidia. A few aberrant species with thin-walled, pale-coloured setae more or less studded with lumps of lime connect the present genus with *Peniophora*. The species were formerly included in *Stereum* and *Corticium*.

*I. Upper portion of sporophore usually free and reflexed.*

*Spores colourless.*

**Hymenochaete rubiginosa.** Lév. (fig. 5A, p. 94.)

Coriaceous, rigid, effused, reflexed, velvety then glabrous, ferruginous-brown, intermediate stratum foxy rust-colour; hymenium rust-colour, setae conical-acute, or cylindrical and obtuse,  $80-100 \times 5-8 \mu$ ; spores elliptical,  $5 \times 3 \mu$ .

*Hymenochaete rubiginosa*, Lév., Ann. Sci. Nat., ser. 3, v. p. 151; Mass., Mon. Thel., p. 97.

On wood. Sometimes altogether resupinate or with the margin only free, or with little reflexed pileoli springing as it were from the surface of the adnate portion, or broadly reflexed and densely imbricate, ferruginous brown, often with a purple tinge; margin usually brighter and becoming smooth. Hymenium sometimes concentrically undulate. In addition to the normal setae, stout cylindrical, obtuse, thin-walled, pale-brown bodies intermediate between setae and cystidia are sparingly met with in the hymenium; somewhat resembling *H. tabacina*, but distinguished at once by the colourless spores.

**Hymenochaete avellana.** Cooke.

Coriaceous, hard; effused margin obtuse, free, narrowly reflexed, reddish-brown velvety; hymenium minutely velvety, pale brown, readily becoming stained with red on being bruised; setae cylindrical, obtuse,  $80-140 \times 7-9 \mu$ ; spores cylindric-elliptical,  $6-7 \times 3 \mu$ .

*Hymenochaete avellana*, Cke., Grev. viii. 146; Mass., Mon. Thel., p. 103.

*Stereum avellanum*, Fries, Epicr. 551.

On hazel, beech, &c. Patches small as a rule, sometimes effused; margin free all round or reflexed above; hymenium when dry dingy ferruginous, pruinose.

*II. Entirely resupinate.*\* *Spores colourless.****Hymenochaete nigrescens.* Cooke.**

Peltate, applanate, solitary or gregarious and sometimes confluent, rigid, margin sometimes free and slightly reflexed; hymenium setulose, brown then blackish; setae conical, blackish,  $80-140 \times 10-12 \mu$ ; spores elliptical,  $10 \times 5 \mu$ .

*Hymenochaete nigrescens*, Cooke, in herb; Mass., Mon. Theleph., p. 104.

On dry wood. Sub-circular, 1-2 in. across. Adnate, margin often free and upturned, almost smooth and greyish below. Commencing as circular patches which usually soon become confluent. Often radially cracked through the entire substance. Hymenium blackish-umber, setulose, setae almost black and opaque, numerous.

***Hymenochaete Stevensonii.* B. & Br.**

Pale fawn-colour, rigid, margin obtuse, elevated; setae rigid,  $20-40 \times 8-10 \mu$ ; spores elliptic-fusoid,  $6-7 \times 3-4 \mu$ .

*Hymenochaete Stevensonii*, B. and Br., Ann. Nat. Hist., ser. 5, v. iii. (1879), p. 211; Mass., Mon. Thel., p. 106.

On yew. A very distinct species with an abrupt margin which is sometimes a little thickened or raised; hymenium livid, or greyish pink, with a tinge of lilac when dry. Patches about 1 in. across.

***Hymenochaete leonina.* Berk. & Curt.**

Entirely resupinate, orange-ferruginous; margin tomentose; hymenium unequal, inseparable, not cracked; setae acuminate, thick,  $20-30 \times 12-15 \mu$ ; spores subglobose,  $6 \times 5 \mu$ .

*Hymenochaete leonina*, B. and C.; Mass., Mon. Thel., p. 107.

On dead wood. Broadly effused for several inches, thin, firmly adnate; margin almost indeterminate; setae rare; hymenium variable in colour, often ferruginous-orange with patches of pure yellow.

***Hymenochaete fuliginosa.* Lév.**

Effused, coriaceous, compact, obscure smoky-brown; hy-

menium even, densely setulose, setae  $30-50 \times 6-8 \mu$ ; spores subglobose,  $5 \times 4 \mu$ .

*Hymenochaete fuliginosa*, Lév., Ann. Sci., Nat., ser. 3, 1846, p. 152; Mass., Mon. Thel., p. 109.

On wood. Thin, closely adnate, margin very thin, yellowish rust; often much broken into patches and almost indeterminate; hymenium umber with rust or purple tinge, appearing almost smooth under a lens, sometimes minutely cracked and brighter in colour. The setae are often clear purple by transmitted light, instead of brown, the usual colour.

**\*\* Spores coloured, usually olive.**

***Hymenochaete corrugata*. Lév.**

Broadly effused, closely adnate, rigid, pale cinnamon; hymenium setulose; when dry very much cracked; setae conico-acuminate,  $70-120 \times 8-10 \mu$ ; spores elliptical, olive,  $7-8 \times 4-5 \mu$ .

*Hymenochaete corrugata*, Lév., Ann. Sci. Nat., ser. 3, v. p. 152; Mass., Mon. Thel., p. 110.

On wood. Broadly effused, closely adnate, so that the irregularities of the matrix are followed; hymenium varying from dark brown, through ferruginous to cinnamon and dirty grey when dry, there is no tinge of purple. Cracked into polygonal areas when dry.

***Hymenochaete croceo-ferruginea*. Mass.**

Broadly effused, incrusting, closely adnate, very thin, varying from orange-ferruginous to brownish; hymenium very minutely velvety; cracked when dry; setae cylindrical, inflated at the base;  $70-100 \times 30-35 \mu$ ; spores subglobose, olive,  $7 \times 6 \mu$ .

*Hymenochaete croceo-ferruginea*, Mass., Mon. Thel., p. 110.

On dead rose stems. Margin sometimes byssoid, at others indeterminate. Resembling *H. corrugata*, but differing in the very much swollen bases of the setae and the subglobose spores.

***Hymenochaete tabacina*. Lév.**

Subcoriaceous, thin, flaccid, effused, margin often reflexed, silky, at length smooth, subferruginous, intermediate stratum and margin bright golden-yellow; hymenium cinnamon or

ferruginous with a purple tinge, usually cracked, minutely velvety; setae conico-acuminate,  $80-130 \times 10-14 \mu$ ; spores elliptical, olive,  $5-6 \times 3 \mu$ .

*Hymenochaete tabacina*, Lév., Ann. Sci. Nat., ser. 3, v. p. 152; Mass., Mon. Thel., p. 112.

On trunks, &c. Distinguished by the golden yellow margin and coloured spores. Sometimes almost completely covering the under side of fallen logs. When moist dirty ferruginous passing to mulberry-colour. Rigid when dry, adnate, margin broadly free all round and more or less lobed, or free and reflexed above, rugulose. Hymenium often cracked when dry in lines radiating from the centre, or from several starting-points in broadly effused specimens.

\*\*\* *Setae subclavate, often rough at the apex with particles of lime.*

***Hymenochaete crassa*. Cke.**

Resupinate, coriaceous, minutely velvety, pale rufous, margin thickened, at length free; hymenium unequal, velvety, rufous; setae subclavate, often rough at the apex;  $70-130 \times 7-14 \mu$ ; spores cylindric-ellipsoid,  $7-8 \times 4 \mu$ .

*Hymenochaete crassa*, Berk., Cke., Grev. viii. p. 148; Mass., Mon. Thel., p. 114.

*Thelephora crassa*, Lév., Voy. Bonite, t. 139, f. 1 B.

On trunks. From 1-2 in. across, known by the thickened, more or less free margin and the clavate setae.

**CORTICIUM. Fr. (emended). (figs. 4, 5, p. 94.)**

Hymenophore broadly effused, entirely resupinate or with the extreme margin free; hymenium smooth, waxy, polished, composed of basidia and paraphyses only (no cystidia), which originate directly from the mycelium without an intermediate compact stratum; spores continuous, colourless.

*Corticium*, Fries, Epicr., p. 556 (in part); emended in Mass., Mon. Theleph., p. 117.

*Thelephora* (in part) of most old authors.

As defined above, the leading features of the genus are:—Hymenium covering the whole free surface of the fungus, which is closely adnate by the whole of the under surface to

the substratum; in a few species of high development the extreme margin is free and sometimes more or less upraised. The hymenium is perfectly glabrous and waxy, owing to the entire absence of projecting cystidia, which give it a velvety or minutely hispid appearance in the genera *Peniophora* and *Hymenochaete*. When dry the hymenium is often cracked, owing to contraction. The nodulose or uneven appearance of the hymenium in some species is mainly due to having grown on an uneven surface, as bark, &c.

\* *Margin determinate, free.*

**Corticium salicinum.** Fr. (figs. 4, 5, p. 94.)

Coriaceous, soft, rigid when dry, fixed by the centre; margin raised all round; hymenium blood-red; whitish and villous below; spores cylindric-oblong,  $14-16 \times 5-6 \mu$ .

*Corticium salicinum*, Fries, Hym. Eur., p. 657; Stev., Fung., p. 647; Mass., Mon. Theleph., p. 118, pl. vi. f. 1.

On willow, poplar, &c. When young resembling a *Peziza*, often becoming effused for 1 in. or more, margin always upturned.

**Corticium evolvens.** Fr.

Patches marginate, often effuso-reflexed, soft, whitish and tomentose below; hymenium subrugose, pale brown then ochraceous or whitish, cracked when dry; spores elliptical,  $10-12 \times 5 \mu$ .

*Corticium evolvens*, Fries, Hym. Eur., p. 646; Mass., Mon. Thel., p. 118, pl. vi. f. 4.

On bark, especially of rosaceous trees. Often commencing as detached minute round patches, which sometimes assume a saucer-like form and remain solitary; more frequently several become confluent and form irregular patches, with the margin more or less upraised and fibrillose below; hymenium dirty ochraceous, sometimes with a lilac tinge, cracked when dry, and showing the fibrillose subiculum.

**Corticium porosum.** B. & Curt.

Often effused for several inches, margin sometimes determinate and slightly raised, at others almost indeterminate; hymenium when well developed, waxy, even, pallid, with

little scattered pits or depressions; spores elliptic-oblong,  $7 \times 4 \mu$ .

*Corticium porosum*, Berk. and Curt., Ann. Nat. Hist., ser. 5, iii. (1879), p. 211; Mass., Mon. Thel., p. 121.

On wood. Colour of wash leather; hymenium often sterile, and then spongy and porous. When dry often cracked into large pieces, gaping, the edges curling up.

The pores look as if little dewdrops had settled on the hymenium, which had in consequence contracted, or rather retracted. (B. & C.)

***Corticium populinum*. Fr.**

Usually commencing as minute silky patches that become confluent and effused, and with the margin involute; hymenium uneven, greyish ferruginous; white and downy below; spores subglobose,  $7-8 \mu$  diameter.

*Corticium populinum*, Fries, Epicr. 559; Mass., Mon. Thel., p. 121.

On poplar. Often springing from old *Sphaeriae*; distinguished amongst its allies by the ferruginous hymenium and subglobose spores.

***Corticium lycii*. Cooke.**

Commencing as small round patches that run into each other and form an irregular, effused thin patch, margin usually free, but not always, hymenium bright lilac, when old often with a tinge of ochre, not cracked when dry; spores elliptical,  $8 \times 4 \mu$ .

*Corticium lycii*, Cooke, in Mass., Mon. Thel., p. 122.

*Thelephora lycii*, Pers.

On *Lycium* and *Syringa*. Care must be taken not to confound the present species with young resupinate specimens of *Stereum purpureum*.

\*\* Margin not free, indeterminate, byssoid or strigose.

† Hymenium whitish or ochraceous.

***Corticium calceum*. Fr.**

Thin, broadly effused, margin usually determinate, but closely adglutinated, hymenium smooth, polished, whitish,

often tinged with lilac or pale ochre when dry; spores cylindric-ellipsoid,  $8 \times 4 \mu$ .

*Corticium calceum*, Fr., Hym. Eur., p. 652; Mass., Mon. Thel., p. 127.

On wood. Often effused for several inches, thin, when dry sometimes cracked, at others not.

***Corticium sebaceum*. Mass.**

Effused, rather fleshy, often incrusting twigs and grass in a stalactitic manner, white; hymenium collapsing when dry, pruinose; spores elliptical, apiculate at the base,  $14-16 \times 7-9 \mu$ .

*Corticium sebaceum*, Mass., Mon. Theleph., p. 127.

*Thelephora sebacea*, Berk., Outl., t. 17, f. 6; Cke. Hdbk., n. 904.

On the ground, or running up grass, twigs, &c. Whitish, rather pulpy when fresh; the hymenium when perfectly formed smooth and waxy, becoming pallid when dry.

***Corticium scutellare*. B. & C.**

Broadly effused, thin, inseparable from the matrix, margin indistinct, white then dirty tan-colour or tawny; hymenium waxy, smooth, very much cracked in an areolate manner, interstices silky, white; spores elliptical,  $5 \times 3 \mu$ .

*Corticium scutellare*, Berk. and Curt., Grevillea, ii. p. 4; Mass., Mon. Thel., p. 128.

On wood, herbaceous stems, &c. Recognised by the areolately cracked, tan-coloured hymenium and small spores.

***Corticium foetidum*. B. & Br.**

Foetid, effused, crust-like, velvety below; hymenium whitish, then pale tan; spores elliptical,  $7 \times 4 \mu$ .

*Corticium foetidum*, Berk. and Broome, Ann. Nat. Hist., ser. 5, iii. 1879, p. 211; Mass., Mon. Thel., p. 131, pl. vi. f. 3.

Forming a thin crust on sawdust; hymenium pallid when dry, even or rather rugged from inequalities of the matrix. Very foetid when fresh.

***Corticium lacteum*. Fr.**

Broadly effused, submembranaceous, usually more or less irregularly lobed and broken up, under surface and margin fibrillose; hymenium waxy, cracked, showing the fibrillose



substratum, whitish, pale ochraceous or buff when dry; spores subglobose, 5–6  $\mu$ .

*Corticium lacteum*, Fries, Hym. Eur., p. 649; Mass., Mon. Thel., p. 132.

On wood. Broadly effused, often in very irregular patches; whitish, ochraceous, or pale buff when dry; margin indeterminate, fibrillose, often radiating in long, thick, mycelial strands in a frondose manner for several inches; hymenium when perfect smooth, cracked. Differs from *C. radiatum* in the cracked hymenium, and from *C. radians* in the subglobose spores. Often imperfect and barren.

***Corticium confluens*. Fr.**

Closely adnate, thin, margin radiating but not fibrillose; hymenium hyaline, whitish when dry; spores cylindric-ellipsoid, 20  $\times$  10  $\mu$ .

*Corticium confluens*, Fries, Hym. Eur., p. 655; Mass., Mon. Thel., p. 133.

On bark, usually beech. Often originating as isolated rounded patches, which soon become confluent; closely adnate, thin.

***Corticium arachnoideum*. Berk.**

Thin, effused, white or pallid, margin not determinate, fibrillose or subfloccose below, margin fimbriated with white fibrils; hymenium waxy, continuous, when dry becoming cracked; spores globose, 6–7  $\mu$  diameter.

*Corticium arachnoideum*, Berk., Ann. Nat. Hist. xiii. (1844), p. 345; Mass., Mon. Thel., p. 135.

On wood, bark, running over moss, &c. Forming delicate, effused, arachnoid patches of a snowy white; threads by no means forming fibres, but spreading like a delicate web and often remaining barren; but under favourable circumstances giving rise to a smooth hymenium, consisting of elliptic sporophores arranged in little bunches. Its habit is not unlike that of *Thelephora bombycina*, B. (Berk.)

The specimens on which Berkeley founded the species were in the hypochnoid condition, but afterwards numerous well-developed specimens were collected, showing the hymenium continuous for several inches, pale ochraceous (when dry) or often with a tinge of glaucous green, slightly cracked; margin shading off into radiating mycelium, cobweb-like or

mealy; frequently when growing in damp dark places the whole plant remains arachnoid, with basidia in scattered tufts, and not forming a continuous hymenium.

**Corticium typhae.** Fuckel.

Very thin, longitudinally effused, at first appearing as small, distinct, white, byssoid spots; hymenium at first smooth, then minutely mealy, and sometimes slightly cracked; margin sometimes indeterminate and mealy; spores elliptical,  $6 \times 3-4 \mu$ .

*Corticium typhae*, Fuckel, Symb., p. 27; Mass., Mon. Thel., p. 137.

On dead dry leaves of *Typha*, *Carex*, &c. Forming small, elongated patches, hymenium dull buff when dry.

**Corticium sambuci.** Fr.

Broadly effused, subinnate, incrusting and often surrounding the branch or trunk, indeterminate, pure white, continuous when growing, collapsing and often more or less powdery when dry; spores elliptical,  $8-10 \times 5-6 \mu$ .

*Corticium sambuci*, Fries., Hym. Eur., p. 660; Mass., Mon. Thel., p. 137.

On elder trunks. Forming broadly effused, thin, inseparable white patches.

**Corticium lactescens.** Berk.

Broadly effused, closely adnate, rather thick, exuding a whitish watery milk when broken; margin rather thin, byssoid, sterile; hymenium when dry, smooth, polished, ochraceous, or sometimes reddish, becoming cracked; spores globose,  $4 \mu$  diameter.

*Corticium lactescens*, Berk., Outl., p. 274; Mass., Mon. Thel., p. 138.

*Thelephora salicina*, Pers., Myc. Eur. i. p. 133.

On oak, willow, &c. Forming thickish, broadly effused patches that give out a white milk when broken. Hymenium usually much cracked when dry.

**Corticium lacunosum.** B. & Br.

Broadly effused, soft, mycelium cinnamon or dirty ochraceous, felt-like, lacunose; hymenium ochraceous or cinnamon, waxy, polished, not cracked when dry, spores elliptical,  $7 \times 4-5 \mu$ .

*Corticium porosum*, B. and Br., Ann. Nat. Hist., ser. 4, xi. p. 343; Mass., Mon. Thel., p. 138.

On wood. Broadly and irregularly effused, generally loosely fibrillose and spongy, with variously-sized pores or lacunae on the surface; vaguely spreading on the surface of wood and passing on to surrounding bodies on the ground, sometimes forming a thick felt with scattered tufts of sporophores, as in the imperfect forms of *Cort. arachnoideum*; sometimes passing from the above stage into a compact, continuous, waxy hymenium of an ochraceous or pale cinnamon colour when dry. The hyphae are 4-5  $\mu$ . thick, and furnished with numerous clamp-connections; resembling in habit *Corticium porosum*, differs in the spores and in the hymenium not being cracked when dry.

***Corticium radiosum*. Fr.**

Subrotund, thin, closely adnate, margin white, fibrillose, radiating; hymenium dingy ochraceous, not cracked when dry; spores subglobose, 5-6  $\mu$ . diameter.

*Corticium radiosum*, Fries, Hym. Eur., p. 649; Mass., Mon. Thel., p. 139.

*Athelia ochracea*, Pers., Myc. Eur., i. p. 84.

*Corticium radians*, B. and Br.

On rotten wood. Somewhat resembling *C. lacteum* in habit, but distinguished by the dark ochraceous hymenium, which does not crack when dry.

✱ *Hymenium brightly coloured.*

***Corticium roseolum*. Mass.**

Very broadly effused, indeterminate, very thin and inseparable from the matrix; hymenium continuous, bright rose-coloured, becoming pale; spores subglobose, apiculate 7  $\times$  8-9  $\mu$ .

*Corticium roseolum*, Massee, in Mon. Thel., p. 140.

On old worked wood. Spreading irregularly for many inches on smooth wood, exceedingly thin, adglutinated, margin vague; hymenium not cracked when dry, at first of a bright rose-colour, then becoming pale and persisting as pale ochraceous, with only a tinge of rose when dry. Spores very abundant, resembling in habit *Peniophora incarnata*

(*Corticium incarnatum*, Fr.), also *Peniophora rosea* (*Corticium roseum*, Fr.), but separated from both by the absence of projecting cystidia and different spores.

**Corticium aurora.** Berk.

Very thin, effused, closely adglutinated, rosy, becoming pale, margin indeterminate; spores ellipsoid, apiculate,  $10-11 \times 7-8 \mu$ .

*Corticium aurora*, Berk., Outl., p. 276; Mass., Mon. Thel., p. 141.

On dead leaves of *Carex*, &c. Very thin, effused, pink, becoming whitish. Distinguished from *Corticium typhae* by the large subpyriform or pip-shaped spores.

**Corticium anthochroum.** Fr.

Broadly effused, thin, bright rose-colour or brick-red with a rosy tinge, becoming pale, margin byssoid, paler; spores elliptical,  $11-13 \times 8-9 \mu$ .

*Corticium anthochroum*, Fries, Hym. Eur., p. 661, Mass., Mon. Thel., p. 141.

*Thelephora anthochroa*, Pers., Syn., p. 576.

On bark. Hymenium when perfect, waxy and sometimes cracked when dry; usually sterile and minutely velvety under a lens.

**Corticium molle.** Fr.

Subrotund, fleshy, texture loose, soft, margin naked; hymenium pallid, more or less spotted with red, waxy, papillose, cracked when dry; spores cylindric-ellipsoid, obtuse at both ends,  $7 \times 5 \mu$ .

*Corticium molle*, Fries, Hym. Eur., p. 660; Mass., Mon. Thel., p. 143.

On wood and bark of pines. Known by the thick, soft, fleshy substance.

**Corticium polygonium.** Fr.

Closely adnate, determinate, margin byssoid; soon indurated; hymenium pinkish, pruinose, usually much cracked; spores cylindric-ellipsoid,  $14-16 \times 5-7 \mu$ .

*Corticium polygonium*, Fries, Hym. Eur., p. 655; Mass., Mon. Thel., p. 145.

On bark, especially poplar, also on wood. Usually

appearing under the form of small, distinct *Tubercularia*-like pustules, which generally become confluent, thick, and again separating more or less when dry, giving the patch a much cracked appearance; sometimes continuous, then tuberculose; margin thin, adnate, byssoid; hymenium pruinose, pinkish, lilac, or dirty ochraceous.

**Corticium sanguineum.** Fries.

Broadly effused, indeterminate, loosely attached to the substratum, cottony below and with the radiating marginal strands blood-red; hymenium smooth, even pale red, then pallid; spores elliptical,  $6 \times 4 \mu$ .

*Corticium sanguineum*, Fries, Hym. Eur., p. 650; Mass., Mon. Thel., p. 146.

On wood, fallen branches, &c. Irregularly and often very broadly effused, thin, margin fibrillose or byssoid, running off into spreading strands of mycelium of a blood-red colour, mixed with thicker blackish-red radiating cord-like threads which penetrate and stain the wood red. Hymenium rarely red, generally pinkish or dirty ochraceous when dry, slightly cracked, often barren and minutely fibrillose. Usually rare, but during the rainy season of 1891 was found abundantly in the New Forest, near Lyndhurst, covering the under surface of branches lying on the ground.

**Corticium Carlylei.** Mass.

Forming closely adnate, elongated patches, waxy, thin, polished, margin white, soon disappearing; hymenium naked, dingy orange, not cracked when dry; spores cylindric-ellipsoid, both ends obtuse, curved,  $18-20 \times 5-6 \mu$ .

*Corticium Carlylei*, Mass., Mon. Thel., p. 148.

Forming elongated patches, often several inches long by about 1 in. broad, very closely attached to the matrix, and when dry, contracting below the level of the bark. Hymenium rather shining, of a dingy orange, with sometimes a foxy tinge; when in full vigour there is usually a narrow whitish margin, which, however, generally disappears with age. The hymenium does not change colour in drying, neither does it become in the least cracked.

**Corticium flaveolum.** Mass.

Effused, membranaceous, loosely attached to the matrix,

margin determinate; hymenium glabrous, pale-primrose-yellow; spores cylindric-ellipsoid, both ends obtuse,  $7 \times 5 \mu$ ,

*Corticium flaveolum*, Massee, Mon. Thel., p. 150.

On trunk of tree-fern in a conservatory. Two to three inches broad, suborbicular or variously lobed, clear but pale primrose-yellow.

**Corticium coeruleum. Fr.**

Broadly effused, adnate, tomentose, bright blue, byssoid margin whitish, extreme margin sometimes free; hymenium waxy, rather soft, pale when dry; spores elliptical,  $8 \times 4 \mu$ .

*Corticium coeruleum*, Fries, Hym. Eur., p. 651; Mass., Mon. Thel., p. 151.

*Auricularia phosphorea*, Sow. t. 350.

On wood. Irregularly effused, adnate or sometimes the extreme margin free; margin fibrous, radiating, buff, or whitish; hymenium when in full vigour intense blue, satiny, often becoming pale in the centre. Said to be phosphorescent.

**Corticium violaceo-lividum. Fr.**

Forming closely adnate, hard patches 1 in. or more across, dingy reddish-purple, margin paler; hymenium usually corrugated or tuberculose, covered at first with white-bloom; spores cylindric-ellipsoid,  $8 \times 4 \mu$ .

*Corticium violaceo-lividum*, Fr., Hym. Eur., p. 655; Stev., Brit. Fung., p. 280; Mass., Mon. Thel., p. 151.

On wood. Hymenium dingy purple when dry, not cracked.

**Corticium lividum. Pers.**

Thin, effused, closely adnate, waxy and soft, variously coloured, bluish-grey, dingy purple, &c., margin similar; hymenium even, naked (not pruinose), subviscid at maturity, cracked when dry; spores cylindric-ellipsoid,  $7-8 \times 4 \mu$ .

*Corticium lividum*, Persoon, Obs., i. p. 38; Mass., Mon. Thel., p. 152.

On wood. Distinguished from *C. violaceo-lividum* by the hymenium not being pruinose, cracked when dry, and by having the margin coloured like the hymenium.

**Corticium atro-virens. Fr.**

Irregularly effused, very thin, blackish-green, under surface and indeterminate margin tomentose, similarly coloured;

hymenium when perfectly developed, paler, glaucous, and waxy; spores subglobose, 4-5  $\mu$ . diameter.

*Corticium atro-virens*, Fries, Hym. Eur., p. 651; Mass., Mon. Thel., p. 156; Stev., Fung., p. 277.

On rotten wood, leaves, sticks, &c.

\*\*\* *Developing on twigs below the bark, which is pushed off.*

***Corticium comedens*. Fr.**

Effused, innate, inseparable from the matrix, exposed by the rupture of the bark, dingy lilac, then becoming pale; hymenium even, glabrous, cracked when dry; spores cylindric-ellipsoid, at length, curved, 14-16  $\times$  6-7  $\mu$ .

*Corticium comedens*, Fries, Hym. Eur., p. 656; Mass., Mon. Thel., p. 155.

On branches, especially hazel. Originates below the bark, which eventually becomes torn and reflexed, exposing the hymenium, which is at first purplish, becoming almost white; slightly viscid when moist.

***Corticium nigrescens*. Fries.**

Effused, interrupted, exposed by the rupture of the bark, closely adnate, thin, yellowish, then becoming blackish; hymenium sometimes papillose, waxy, slightly pruinose; spores cylindric-oblong, obtuse at both ends, curved 18-20  $\times$  5-6  $\mu$ .

*Corticium nigrescens*, Fries, Epicr., p. 565; Mass., Mon. Thel., p. 155.

On branches. Originating beneath the bark, resembling *C. comedens* in habit, but distinguished by being pale at first, and then becoming blackish, whereas the last named is purple when growing and becoming whitish with age. Effused, very thin, closely adglutinated, indeterminate; hymenium waxy, powdered with the very large colourless spores.

**STEREUM. Pers. (emended). (figs. 11-14, p. 97.)**

Furnished with a distinct central stem, horizontal and attached by a broad base, or entirely resupinate; hymenium smooth, even, inferior in the stipitate or reflexed forms, superior in resupinate species, originating from a compact

intermediate layer; basidia tetrasporous; spores continuous, hyaline or coloured.

*Stereum*, Persoon, Obs. Myc., p. 35; Mass., Mon. Thel., p. 158.

The leading characters of the present genus are the smooth, even hymenium, and the velvety or strigose pileus. In *Peniophora* and *Hymenochaete* the habit is the same as those of resupinate or reflexed species of the present genus, but in both the hymenium is minutely velvety or setulose. In the present genus there is an unbroken sequence from the *Mesopod* or central-stemmed type, with a more or less funnel-shaped pileus and inferior hymenium, through the lateral-stemmed or *flabelliform*, to the effused stage with a more or less developed free margin, or several free margins springing from the effused and adnate portion in a superposed, *imbricate* or *dimidiate* manner. This last leads by degrees to the lowest type, where the whole fungus is closely adnate to the substratum by its under surface, and consequently, having the hymenium uppermost, thus closely agreeing with the normal condition in the genus *Corticium*, but distinguished by the presence of a layer of closely compacted hyphae, which directly gives origin to the elements of the hymenial layer; from the underside of this compact layer a loose felted layer of hyphae rests on and penetrates the substratum. In *Corticium* no such layer exists. Again, in *Stereum*, as a rule the hymenium does not become cracked when dry, as is frequently the case in *Corticium*, and in the resupinate forms the margin is rarely indeterminate, but usually more or less free and strigose.

\* *Pileus infundibuliform, stem central.*

**Stereum Sowerbei.** Massee. (fig. 13, p. 97.)

Snow-white, pileus infundibuliform,  $\frac{1}{2}$ –1 in. across, rather rough with projecting points, but not velvety, margin variously incised; hymenium smooth; spores elliptical,  $5 \times 3 \mu$ .

*Stereum Sowerbei*, Mass., Mon. Thel., p. 164.

*Thelephora Sowerbei*, Berk., Outl., p. 206.

*Elvella pannosa*, Sow., Fung., t. 155.

On the ground. A very beautiful species, snow-white, tinged with pale buff when old, and of a waxy appearance.



when fresh; sometimes with a distinct round stem  $\frac{1}{2}$  in. or more in height, at others several plants grow close together, having their stems more or less confluent at the base. It has no relationship with *Cladoderris*, as suggested by Fries in *Summa. Veg. Scand.*, p. 332.

***Stereum tuberosum*. Mass.**

White, becoming pallid or reddish, pileus cut nearly or quite down to the tuberos base into narrow irregular segments arranged in an infundibuliform manner; stem when distinct, slender; hymenium almost even; spores elliptical, colourless, smooth,  $7-8 \times 5 \mu$ .

*Thelephora tuberosa*, Fr., Grev., Sc. Or. Fl., t. 178; Berk., Outl., p. 267; Cke., Hdbk., n. 892; Stev., B. Fung. ii. 262.

On the ground. About 1 in. high. Pileus infundibuliform but cut into narrow segments, removed from *Thelephora* on account of the smooth hymenium and elliptical smooth, colourless spores. Distinguished from *S. Sowerbei* by the pileus being cut down nearly to the base into narrow segments, and the tuberos base to the stem.

***Stereum undulatum*. Mass.**

Pileus whitish becoming tan, depressed, minutely fibrillose, margin undulated, stem short, villous; hymenium minutely velvety, pale tan; spores broadly pip-shaped,  $10 \times 6 \mu$ .

*Thelephora undulata*, Fr., Hym. Eur., 663; Stev., B. Fung. 262.

On the ground, From  $\frac{1}{2}$ -1 in. high, pileus depressed or funnel-shaped, stem short, remarkable for the minutely velvety, buff hymenium.

***Stereum multizonatum*. B. & Br.**

Tough and cartilaginous when fresh, pileus deeply infundibuliform, variously cut and lobed and passing into a short stem, bright brownish flesh-colour, zoned with darker bands; hymenium smooth, paler than the pileus, rugulose, powdered with the white spores; numerous pilei are variously grown together, the stems are also confluent at the base, thus forming dense tufts; spores elliptical, colourless,  $8-9 \times 4-5 \mu$ .

*Stereum multizonatum*, Berk. and Broome, Ann. Nat. Hist., Ser. 3, xv. p. 321, pl. xiii. f. 4; Mass., Mon. Thel., p. 167.

On the ground. Forming dense tufts 6-10 in. across and 2-3 in. high. Substance of pileus thin, crisp and cartilaginous when fresh, and of a beautiful flesh-colour. The dark zones vary much in intensity in different specimens.

**\*\* Horizontal and attached by a broad base, or resupinate with a reflexed upper margin.**

**Stereum hirsutum. Fr.**

Wholly resupinate, or usually effuso-reflexed; pileus coarsely strigose, dingy ochraceous, becoming pale and greyish, indistinctly zoned, substance thin and coriaceous; hymenium even, glabrous, naked, bright ochraceous or pale tan-colour; spores globose,  $5\ \mu$  diameter.

*Stereum hirsutum*, Fries, Epicr., p. 549; Mass., Mon. Thel., p. 181.

On trunks and branches. Very variable in form, when growing on a broad surface often wholly resupinate or with a very narrow free portion. When developed on smaller branches there is often a broad, free, reflexed portion, or several such arranged in an imbricated fashion. Pileus coarsely velvety or strigose; hymenium usually bright ochraceous, often with varying shades of pink or grey.

**Var. subcostatum. Karst.**

Hymenium naked, vaguely costate or rugose, yellowish-white, bright flesh-colour or yellowish-red towards the base.

*Stereum subcostatum*, Karsten, Hedwigia, 1881, p. 178.

Certainly not a good species, intermediate forms leading up to the typical form of *S. hirsutum* being not uncommon.

**Var. cristulatum. Quelet.**

Pileus strigose, grey; hymenium flesh-colour.

Quelet, Fung. Jura, iii., t. 1, f. 15.

**Stereum ochroleucum. Fr. (figs. 11, 12, p. 97).**

Horizontal and attached by a narrow or broad base, effused, with the upper free margin reflexed, or entirely resupinate; pileus coriaceous, rather thick, flaccid, silky, zoned, greyish-white; hymenium pale ochraceous, smooth, cracked, especially when dry; spores broadly elliptical,  $8 \times 6\ \mu$ .

*Stereum ochroleucum*, Fries, Hym. Eur., p. 639; Mass., Mon. Thel., p. 184.

*Corticium ochroleucum*, Fries, Epicr., p. 577.

On wood and bark. Silky or strigose, becoming smooth when old. It is not unusual to meet with all stages from flabelliform to entirely resupinate. Distinguished from *S. strigosum* by the very pale ochraceous hymenium that becomes much cracked when dry; the spores are also different.

*Stereum purpureum*. Pers. (fig. 14, p. 97.)

Coriaceous but pliant, effuso-reflexed, more or less imbricated, tomentose, zoned, whitish or pallid; hymenium naked, smooth, even, pale clear purple, becoming dingy ochraceous with only a tinge of purple when dry; spores elliptical,  $7-8 \times 4 \mu$ .

*Stereum purpureum*, Persoon, Obs. Myc. ii. p. 92; Mass., Mon. Thel., p. 186.

On trunks, branches, &c. Variable; often broadly adnate, with the extreme margin only free and reflexed, or broadly reflexed and imbricate, when the individuals are often small, not more than  $\frac{1}{2}$ -1 in. across, but sometimes much larger, rather thin, rigid and incurved when dry. Pileus silky, tomentose, not coarsely strigose as in *S. hirsutum*, and often with one or two narrow black zones near the margin; hymenium more or less purple, becoming dingy ochre when dry.

*Stereum sanguinolentum*. Fr.

Effuso-reflexed, thin, coriaceous, pileus silky-adpressed, substriate, pallid, margin acute, whitish; hymenium even, glabrous, very delicately pruinose when old, becoming stained with dingy red when rubbed; spores cylindric-ellipsoid, slightly curved,  $8-9 \times 4-5 \mu$ .

*Stereum sanguinolentum*, Fries, Epicr., p. 549; Mass., Mon. Thel., p. 189.

On pine and other wood. Densely gregarious; at first resupinate and circular, at length dimidiate or with the margin more or less reflexed all round, silky or almost strigose, zoned, the zones darker; hymenium rough from the inequalities of the matrix, otherwise smooth, pale greyish-brown, when scratched or bruised becoming instantly blood-red. (Berk.)

**Stereum rugosum. Fr.**

Broadly effused, sometimes shortly reflexed, coriaceous, at length thick and rigid, pileus at length smooth, brownish; hymenium pale greyish-yellow, changing slightly to red when bruised, pruinose; spores cylindrico-elliptical, straight,  $11-12 \times 4-5 \mu$ .

*Stereum rugosum*, Fries, Epicr., p. 552; Mass., Mon. Thel., p. 191.

*Thelephora lauro-cerasi*, Berk., Engl. Fl. v. p. 173.

On trunks, &c. Very variable in form, wholly adnate, partly reflexed, or pezizaeform. Agrees with *S. sanguinolentum* in becoming red when bruised, but differs in the thicker, rigid substance, and in the larger, straight spores. The hymenium is sometimes pale-yellow, at others pale-greyish and livid.

**Stereum spadiceum. Fr.**

Coriaceous, thin, effuso-reflexed, villous, subferruginous, the obtuse margin whitish; hymenium smooth, brownish flesh-colour, becoming red when bruised; spores elliptical,  $8 \times 5 \mu$ .

*Stereum spadiceum*, Fries, Epicrasis, p. 549; Mass., Mon. Thel., p. 190.

On trunks, &c. Distinguished amongst the species that turn red when bruised by the dark colour of the hymenium.

**Stereum disciforme. Fr.**

Subcoriaceous, white, resupinate, determinate, the thin margin free, naked, disciform; the hymenium rigid, uneven, pulverulent, pallid; spores subglobose,  $16-18 \mu$  or  $18 \times 15-16 \mu$ .

*Stereum disciforme*, Fries, Epicr., p. 522; Mass., Mon. Thel., p. 189.

*Peniophora disciforme*, Cke., Grevillea, viii. p. 20, t. 122, f. 2.

On oak. Forming patches from  $\frac{1}{2}$  to 1 in. across, firm and rigid.

**Stereum vorticolum. Fr.**

Pileus coriaceous, effuso-reflexed, obscurely zoned, coarsely hirsute, pallid, margin similarly coloured; hymenium slightly rugulose, purple or lilac; spores elliptical  $7 \times 4 \mu$ .

*Stereum vorticolum*, Fries, Obs. ii. p. 275; Mass., Mon. Thel., p. 194.

On bark and wood. Intermediate between *Stereum hirsutum* and *S. purpureum*, agreeing with the former in the coarsely strigose pileus, and with the latter in the colour of the hymenium; known by its thinner substance, which becomes more or less torn when dry.

\*\*\*. Entirely resupinate, margin scarcely or not at all free.

***Stereum rufum*. Fr.**

Coriaceous-cartilaginous, erumpent, at first tuberculiform, then expanding and forming small circular patches; hymenium rufous, then brownish, powdered with a grey bloom, more or less tuberculose, at length cracked; spores elliptical,  $6-7 \times 4 \mu$ .

*Stereum rufum*, Fries, Epicr., p. 552; Mass., Mon. Thel., p. 198.

On bark, usually lime. Bursting through the bark as rounded patches, which spread for some distance, keeping more or less circular in outline, thin, extreme margin free; looking like a *Corticium* in habit; hymenium with small tubercles that are often arranged in indistinct concentric circles.

***Stereum frustulosum*. Fr.**

Tuberculose, woody, crowded and almost confluent, hence looking like one much cracked specimen, under surface and margin glabrous, brownish-black; hymenium convex, cinnamon, becoming pale, pruinose; spores elliptical, ends subacute,  $4-5 \times 3-3.5 \mu$ .

*Stereum frustulosum*, Fries, Epicr., p. 552; Mass., Mon. Thel., p. 199.

*Thelephora frustulosa*, Fries, Syst. Mycol. i. p. 445.

On wood and bark. Some states superficially resemble *Corticium polygonum*. Thick, tuberculose small patches almost confluent; the patches are often cracked completely through, so that the whole presents a tessellated appearance; hymenium usually cinnamon, becoming paler, but sometimes persistently brown.

***Stereum acerinum*. Fr.**

Forming a thin, white, often broadly and irregularly effused crust, even, smooth; spores elliptical,  $6 \times 3-4 \mu$ .

*Stereum acerinum*, Fries, Hym. Eur., p. 645; Mass., Mon. Thel., p. 202.

*Thelephora acerina*, Persoon, Synop., p. 81.

On living bark of *Acer campestre*, also on fallen trunks of other trees. Forming a thin white crust, generally sterile. Surface usually covered with minute particles of lime.

***Stereum stratosum*.** Berk. & Broome.

Effused, clear pale ochraceous, glabrous, here and there rugose becoming yellowish; substance pallid, stratified, strata at length separating.

*Stereum stratosum*, Berk. and Broome, Ann. Nat. Hist., ser. 5, xii. 1883, p. 574; Mass., Mon. Thel., p. 203.

Penzance, Britain. No specimen exists in Berkeley's herbarium, hence I am unable to supplement the above scanty diagnosis.

#### CLADODERRIS. Pers. (figs. 15-17, p. 97.)

Pileus coriaceous, with a central stem, or laterally fixed and sessile; hymenium inferior, with radiating ridges, which are often nodulose; spores smooth, colourless.

*Cladoderris*, Pers., in Fr., Fung. Natal, p. 20.

Approaching *Thelephora* in the radiato-rugulose and nodulose hymenium, but distinguished by the firmer substance and elongated, smooth, colourless spores. In *Stereum*, which the British species superficially resembles, the hymenium is even.

***Cladoderris minima*.** B. & Br. (figs. 15-17, p. 97.)

White, flabelliform, sessile, resupinate; pileus tomentose; hymenium radiato-rugulose; spores elliptic-oblong, apiculate at base, curved,  $14-15 \times 4-5 \mu$ .

*Cladoderris minima*, B. and Br., Ann. Nat. Hist., ser. 5, p. 24 (1878); Stev., B. Fung. ii. p. 226, fig. lxxxv.

On bark. From 2-4 lines across, gregarious, becoming yellowish-tan when dry; looking very much like young specimens of *Stereum hirsutum*, distinguished by the uneven hymenium and the large, sausage-shaped, curved spores.

## CRATERELLUS. Fries. (fig. 6, p. 94.)

Terrestrial; more or less infundibuliform, fleshy or membranaceous, hymenium external and inferior, glabrous, even or rugulose; basidia tetrasporous, spores continuous.

*Craterellus*, Fries, *Epicr.*, p. 531; Stev., *Brit. Fung.*, p. 259.

Closely resembling in size and habit, certain species of *Cantharellus*; in this genus, however, the thick gills are more distinct and usually connected by veins, whereas in the present genus the hymenium is either quite even or at most vaguely rugulose. Allied to the mesopod species of *Thelephora*.

\* *Funnel-shaped, hollow to the base.*

***Craterellus lutescens*. Fr.**

Pileus infundibuliform, brownish, flocculose, undulated, thin; stem elongated, hollow, smooth, yellow; hymenium yellow, at length with anastomosing veins; spores broadly elliptical, apiculate, colourless,  $11-13 \times 7-8 \mu$ .

*Craterellus lutescens*, Berk., *Outl.*, p. 265; Cke., *Hdbk.*, n. 886; Stev., *B. Fung.* 259, f. lxxxiii.

In woods. Smell strong, spirituous; size variable, pileus 1-4 in. across, stem  $1\frac{1}{2}$ -3 in. high, solitary or gregarious; hymenium yellow, tinged orange, red, or ashy. Superficially resembling *Cantharellus tubaeformis* var. *lutescens*, but in the latter the gills are more distinct.

***Craterellus cornucopioides*. Pers. (fig. 6, p. 94.)**

Pileus deeply infundibuliform, thin, smoky-black, squamulose; stem hollow, smooth, black; hymenium grey, becoming indistinctly wrinkled; spores elliptical, apiculate, colourless,  $11-12 \times 7-8 \mu$ .

*Craterellus cornucopioides*, Berk., *Outl.*, p. 266, t. 19, f. 6; Cke., *Hdbk.*, n. 887, f. 79; Stev., *B. Fung.* ii. 260.

In woods. Solitary or most frequently tufted, variable in size, 2-3 in. high. Pileus pervious at the base and the cavity continuous with the hollow stem. Some conditions superficially resemble *Cantharellus cinereus*, but in the latter the thick gills are more distinct.

**\*\* Funnel-shaped, stem stuffed.**

**Craterellus sinuosus. Fr.**

Strong scented, pileus infundibuliform, villous, greyish-brown, margin undulated; stem pale yellow, elongated, stuffed; hymenium with anastomosing ribs, greyish; spores elliptical, pale yellow,  $8-9 \times 5 \mu$ .

*Craterellus sinuosus*, Berk., Outl., p. 266; Cke., Hdbk., n. 888; Stev., B. Fung. ii. 260; Fr., Icon., t. 196.

In woods. Pileus  $\frac{1}{2}$ –1 in. high and broad, stem about 1 in. high, sometimes very short. Smell strong, musky. Hymenium becoming tan coloured when dry. Pileus more or less villose.

**Var. crispus.**

Margin of hymenium sinuous and crisped, pileus pervious, stem stuffed at base only. Hymenium almost even.

*Craterellus crispus*, F., Hym. Eur. 631; Stev., Fung. 260.

**\*\* Irregularly turbinate, solid.**

**Craterellus clavatus. Fr.**

Irregularly turbinate, flexuous, fleshy, flesh white, pale dingy yellow, passing downwards into the thick, solid stem, hymenium at first even, then wrinkled, smoky-purple, becoming paler and pruinose; spores elliptical, pale buff,  $10-12 \times 4-5 \mu$ .

*Craterellus clavatus*, Fr., Hym. Eur., p. 632; Stev., Brit. Fung. 261.

In woods. From  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. across, solitary or clustered, often irregular, flesh thick, white. The hymenium is covered with a white bloom, variable in colour, flesh-colour with violet tinge, smoky purple, or with an umber shade. The pileus is almost plane, often irregularly wavy, hence the plant is more or less solid, and in this respect differs from the usual infundibuliform common character.

**CYPHELLA. Fr. (figs. 9, 10, p. 94.)**

Cup-shaped, mouth not contracted, often pendulous from a short stem-like base, rarely almost flat, substance thin;



hymenium smooth or slightly rugulose; basidia tetrasporous.

*Cyphella*, Fr., Syst. Myc. ii. p. 201.

Cup-shaped and sessile or furnished with a more or less elongated stem and obliquely pendulous, usually villose, resembling minute *Pezizae*, but distinguished by the presence of tetrasporous basidia. The expanded species are known from *Corticium* by the more membranaceous texture, being attached by a central point only, and not by the whole of the sterile surface, and by the tendency to turn the hymenium downward and away from the light.

*A. Stipitate.*

***Cyphella Pimii.* Phill.**

White or very pale yellow, cup-shaped, erect or pendent, membranaceous, pubescent, margin of cup somewhat incised; stem rather slender, crooked, enlarged upwards; spores subpyriform, colourless,  $7-10 \times 4 \mu$ .

*Cyphella Pimii*, Phillips, Grev. xiii. p. 49; Stev., Brit. Fung. ii. 287.

On dead herbaceous stems in water. Fasciculate; about 2 lines high, cup 1 line wide.

***Cyphella capula.* Fr. (figs. 9, 10, p. 94.)**

White or yellowish, membranaceous, obliquely campanulate, pendulous, smooth, margin waved, stem thin; spores elliptical, colourless,  $7 \times 5 \mu$ .

*Cyphella capula*, Berk., Outl., p. 278; Cke., Hdbk., n. 951; Stev., Brit. Fung. ii. 287.

On dead herbaceous stems, gregarious or scattered, 2-3 lines long, white or yellow, cup often irregular, pendulous.

***Cyphella cernua.* Mass.**

Thin, obliquely campanulate, glabrous, contracted into an elongated, equal stem, altogether clear pale primrose yellow; spores subglobose, with a basal apiculus, colourless,  $10 \times 8-9 \mu$ .

*Peziza cernua*, Schum., Fl. Dan., tab. 1970, fig. 3.

On elder bark. Scattered or in clusters of two or three, about 3 lines high. Fries says that the present species appears to be a variety of *Cyphella capula*; but he was not

acquainted with the plant, and judged from the figure quoted above. Distinct in the more erect habit and larger spores.

**Cyphella cuticulosa.** Berk.

White, diaphanous, membranaceous, at first oblong, then cup-shaped, elongated into a stem, smooth externally.

*Cyphella cuticulosa*, Berk., Outl., p. 278; Cke., Hdbk., n. 955; Stev., Brit. Fung. 288; Dicks., Cr., Fasc. iii. t. 9, f. 11.

On grass. Gregarious, 1-2 lines high; a species founded by Berkeley from Dickson's figure, hence not very likely to be again recognised.

**Cyphella lacera.** Fr.

White or yellowish, membranaceous, cup-shaped, pendulous, becoming torn into shreds and covered above with black fibrils, stem short; hymenium pale, wrinkled, spores subglobose, colourless,  $7 \times 6 \mu$ .

*Cyphella lacera*, Berk., Outl., p. 227; Cke., Hdbk., n. 950; Stev., Brit. Fung. ii. 287.

On dead twigs. From 2-3 mm. broad, 4-6 mm. high.

**B. Sessile or Subsessile.**

\* *Spores colourless.*

**Cyphella galeata.** Fr.

Whitish, pale grey when moist, membranaceous, subsessile, helmet-shaped, margin entire; hymenium slightly wrinkled, becoming rufescent; spores elliptical or obovate,  $8-10 \times 5 \mu$ .

*Cyphella galeata*, Berk., Outl., p. 277; Cke., Hdbk., n. 947; Stev., B. Fung. 286.

On mosses. Snow-white at first, then becoming dark cinnamon or rufescent, 2-3 lines across.

**Cyphella Goldbachii.** Weinm.

Whitish, thin, cup-shaped or cylindrical, sessile or sub-stipitate, margin deeply and irregularly lobed, villous; hymenium even, pale; spores globose,  $7-8 \mu$ .

*Cyphella Goldbachii*, Berk., Outl., p. 278; Cke., Hdbk., n. 952; Stev., B. Fung. 288.

*Choetocypha variabilis*, Corda, in Sturm., tab. 63.

On leaves, &c. Gregarious, 1-2 lines high, variable in form, sessile and cup-shaped, or cylindrical and furnished with a distinct stem; margin irregularly torn into segments.

**Cyphella muscigena.** Fr.

Variable in form, membranaceous, cup-shaped, becoming plane, spatulate, stipitate or generally sessile, outside minutely silky, shining-white; hymenium whitish, slightly wrinkled; spores elliptical, colourless,  $8-10 \times 5 \mu$ .

*Cyphella muscigena*, Berk., Outl., p. 277; Cke., Hdbk., n. 946; Stev., Brit. Fung. ii. 286.

Growing on various mosses. Very variable in form, one of the larger species, extending to  $\frac{3}{4}$  in. across.

**Cyphella catilla.** Sm.

Somewhat membranaceous, expanded, margin crisped and undulated. Hymenium veined, grey.

*Cyphella catilla*, W. G. Smith, Seem., Journ. Bot. 1873, p. 337; Stev., Brit. Fung., p. 286, f. lxxxix.

On moss and dead leaves. Often imbricated,  $\frac{3}{4}$  in. broad, allied to *C. galeata*.

**Cyphella fulva.** B. & Rav.

Reddish-cinnamon, sessile, globose, becoming expanded, externally tomentose; hymenium same colour, even; spores colourless, elliptical,  $16 \times 8 \mu$ .

*Cyphella fulva*, Cke., Hdbk., n. 954; Stev., B. Fung. 285.

On dead bark. Scattered, or usually crowded in little clusters, about 1 line across, rough outside with long, brown, aseptate, thick-walled, often curved hairs.

**Cyphella brunnea.** Phil.

Dirty-brown, sessile, cupulate, clothed near the margin with a grey pruina, margin incurved, lacerated, mouth oblique. Hymenium smooth, discoloured brown; flesh paler, subgelatinous; spores colourless, globose,  $5-6 \mu$ .

*Cyphella brunnea*, Phil., Grev., vol. xiii., p. 49; Stev., B. Fung. 285.

On bark and wood of elder-trees. Scattered or crowded, minute.

**Cyphella stuppea.** B. & Br.

Erumpent, sessile, cup-shaped, externally coarsely hispid, brownish, becoming paler; hymenium persistently brown.

*Cyphella stuppea*, B. and Br., Ann. Nat. Hist., n. 1698; Stev., Brit. Fung. 285.

On broom. Erumpent, scattered, sessile on a broad base, rigid when dry; about  $\frac{1}{2}$  line across. I have not succeeded in finding spores in the type specimen. Not a good *Cyphella*.

**Cyphella albo-violascens.** Karst.

Cup-shaped, sessile or nearly so, snow-white, densely villose; hymenium even, pallid with a tinge of violet; spores elliptical,  $12-15 \times 9-10 \mu$ , sometimes inequilateral, colourless.

*Cyphella albo-violascens*, Karst., Fung. Fenn. exs., n. 715.

*Cyphella Curreyi*, B. and Br., Ann. Nat. Hist., n. 935; Cke., Hdbk., n. 953.

On wood, bark, twigs. Not common. Gregarious, about  $\frac{1}{2}$  line across; often proliferous.

**Cyphella villosa.** Karst.

Sessile, whitish, externally villose, contracted and spherical when dry; hymenium even, whitish; spores elliptic-oblong, colourless,  $10-12 \times 7-8 \mu$ .

*Cyphella villosa*, Karst., Myc. Fenn. iii. p. 325.

*Peziza villosa*, Cke., Hdbk., n. 2055.

On stems of herbaceous plants and on branches. Cups  $\frac{1}{4}-\frac{1}{2}$  a line broad, hairy, snow-white or rather pallid. Distinguished from *C. albo-violascens* by the pale hymenium.

**Cyphella dochmiospora.** B. & Br.

White, sessile, cup-shaped, minutely villose, spores elliptical, oblique, acute, colourless,  $14-17 \mu$ .

*Cyphella dochmiospora*, B. and Br., Ann. Nat. Hist., n. 1373; Stev., Brit. Fung. ii. 288.

Minute, snow-white. Distinguished amongst the other minute, white species by the large inequilateral, acute spores.

**Cyphella Berkeleyi.** Mass.

Sessile, globose, then expanding and becoming campanulate, minutely pilose, reddish-grey as well as the even hymenium; spores colourless, elliptical,  $7 \times 5 \mu$ .

*Cyphella griseo-pallida*, Berk., Outl., p. 277; Cke., Hdbk., n. 945; Stev., Brit. Fung., p. 285.

On dead *Carex paniculata*. Scattered,  $\frac{1}{2}$ –1 line across, distinct from *C. griseo-pallida*, Weinm., in the spores and in being found on *Carex* and not wood or bark.

***Cyphella Bloxami*. Br. & Br.**

White, floccoso-membranaceous, margin lobed, disc becoming light yellow, spores elliptical,  $7-8 \times 6 \mu$ .

*Cyphella Bloxami*, B. and Br., Ann. Nat. Hist., n. 1894; Stev., Brit. F. 284.

On *Ulex*. Scattered, very minute.

***Cyphella pallida*. B. & Br.**

Cups at first orbicular, at length irregularly lobed, plane, tomentose or slightly hispid, sessile; hymenium at length wrinkled, pallid ochraceous; spores elliptical,  $6-9 \mu$ .

*Cyphella pallida*, B. and Br., Ann. Nat. Hist., n. 1372; Stev., Brit. Fung. 287.

On old stems of *Clematis vitalba*. Superficial,  $\frac{1}{2}$ –1 line across, sometimes proliferous. Distinct from *C. albo-violascens* in the ochraceous hymenium and irregular shape.

**\*\* Spores coloured.**

***Cyphella fraxinicola*. B. & Br.**

Cup-shaped, sessile, snow-white, minutely villous; hymenium pale yellow, becoming darker; spores elliptical, pale olive, smooth,  $6 \times 4 \mu$ .

*Cyphella fraxinicola*, B. & Br., Ann. Nat. Hist., n. 1446; Stev., Brit. F. ii. 286.

On ash bark. Scattered or gregarious, to the naked eye resembling minute, snow-white cups, not half a line wide. Distinguished by the coloured spores.

***Cyphella muscicola*. Fr.**

Membranaceous, subsessile, cup-shaped, cernuous, minutely fibrillose, whitish; margin irregularly torn and wavy, downy; hymenium even; spores subglobose, pale brown,  $6-7 \mu$ .

*Cyphella muscicola*, Berk., Outl., p. 277; Cke., Hdbk., n. 949; Stev., Brit. Fung. 286.

On mosses. About two lines across, whitish, the whole plant dirty ochraceous when dry.

**Cyphella ochroleuca.** B. & Br.

Very pale ochraceous, membranaceous, villous, cup-shaped, margin becoming torn, sessile; hymenium ochraceous; spores very pale ochraceous, elliptical,  $6 \times 4 \mu$ .

*Cyphella ochroleuca*, B. & Br., Berk., Outl., p. 277; Cke., Hdbk., n. 948; Stev., Brit. Fung. 285.

On dead bramble stems. Scattered,  $1-1\frac{1}{2}$  lines broad.

SOLENIA. Hoffm. (fig. 8, p. 94.)

Sporophore cylindrical, more or less contracted at the mouth; cavity everywhere covered with the hymenium; basidia tetrasporous.

*Solenia*, Hoffmann, Deutschl. Fl., t. 8; Cooke, Hdbk. 1, p. 329.

The species are all minute, rarely exceeding 1 line in height narrowly cylindrical and tubular, the tube being more or less contracted at the mouth, and internally everywhere covered with the hymenium. The species grow on rotten wood, and are often densely crowded. Closely allied to *Cyphella*, distinguished by the contracted mouth of the tube and the crowded habit. At one time the species were considered as belonging to the genus *Peziza*, before the microscope revealed the presence of basidia. Fries places the genus in the *Polyporeae*, but each tube in the present genus is an individual or sporophore, and not simply a hymenophore. The external hairs are in most species rough with particles of lime.

\* *Externally white.*

**Solenia maxima.** Mass. (n. sp.)

Gregarious and subfasciculate, but not crowded; subcylindrical, slightly contracted at the base, externally villous, with slender aseptate hyphae rough with minute particles of lime, whitish or pale buff, about 1 line high; spores elliptical, minutely and obliquely apiculate,  $5 \times 3 \mu$ .

On rotten wood. Forming patches  $\frac{1}{2}$  in. across. Distinguished by its large size.

*Solenia fasciculata*. Pers.

Gregarious and usually fasciculate,  $\frac{1}{2}$ – $\frac{1}{4}$  line high; cylindric-clavate, white, externally minutely silky and almost smooth; spores subglobose, about  $4\mu$  diameter.

*Solenia fasciculata*, Pers., Myc. Eur. i., p. 335, t. 12, f. 8, 9; Sacc. Syll. vi. n. 6588.

*Solenia candida*, Hoffm., Cke., Hdbk., p. 329.

Distinguished amongst British species by its white colour and subglobose spores.

**\*\* Externally ochraceous.**

*Solenia anomala*. Fr.

Usually densely crowded and forming effused patches, about  $\frac{1}{2}$  line high, pyriform, margin of hymenium incurved, externally pilose, varying from dingy ochraceous to ferruginous; spores, cylindric-oblong,  $7 \times 4\mu$ .

*Solenia anomala*, Fries, Hym. Eur., p. 596; Sacc. Syll. vi. n. 6600.

On rotten wood, bark, &c. Densely crowded, either forming compact scattered patches  $\frac{1}{2}$  in. or more across, or continuous for several inches, and superficially resembling a species of *Poria*.

*Var. ochracea*. Mass.

Distinguished from the type form by the scattered habit, and rather smaller size; in colour, form, and size, spores similar.

*Solenia ochracea*, Hoffm., Deutsch. Fl., t. 8, f. 2; Cke., Hdbk., p. 329.

On rotten wood, bark, &c. Usually gregarious, but not densely packed, sometimes scattered, at others rather crowded.

## FAM. IV.

## HYDNEAE.

In the preceding families the hymenium was perfectly even in the majority of species, with just an indication of rugosity in the highest genera of the Thelephoreae, as *Craterellus*, *Cladoderis*, and *Beccaria*; the last is an exotic genus, and forms a transition from the Thelephoreae to the Hydneae, agreeing with the former in habit and the structure of the sporophore, with the latter in the configuration of the hymenium, which is furnished with radiating ridges that are more or less toothed or nodulose at the edge, shadowing the type of structure that is more highly developed in *Irpex*, where the teeth spring from ridges or folds of the hymenium.

In the Hydneae the hymenium is, from the earliest stage of its development, uneven, the inequalities—on which the true hymenial surface is produced—taking the form of spine or wart-like prominences; in the simpler genera nearest to the Thelephoreae, these prominences take the form of crowded or scattered granules or hemispherical prominences of small size, the whole fungus being a thin resupinate film covered on its free surface with these structures, whereas in the higher genera the projections of the surface take the form of blunt tooth-like outgrowths, as in *Irpex* and *Radulum*, whereas in *Hydnum*, which illustrates the highest phase of development to which the Hydneae have attained, the outgrowths from the sporophore which constitute the hymenophore appear as elongated, tapering, pointed spines. It is in this genus also that the hymenophore attains its highest development, passing from the simpler, membranaceous, resupinate forms to the pileate condition, supported on a central stem. A peculiar feature in some of the simpler genera consists in the fact that the warts are more or less excavated or hollowed at the tip, as in *Grandinia*, *Porothelium*, and even in some of the simple resupinate species of *Hydnum*,



or at all events in some species which hitherto have been considered as belonging to *Hydnum*. On the other hand, in the genus *Odontia* the warts or spines are more or less fimbriated or penicillate at the tip.

Up to the present the genus *Porothelium* has been included in the *Polyporeae*, and considered by Fries as having an affinity with, or at all events being analogous to, *Fistulina* in the distinct warts being at first closed, eventually becoming elongated, and more or less excavated at the apex. This relationship was indicated on the supposition that the hymenium lined the cavities, as in the *Polyporeae*, but microscopic examination shows that the hymenium covers the outer surface of the warts, as in the *Hydneae*; hence *Porothelium* must be included in the last-named family, and not far removed from the genus *Grandinia*.

#### HYDNEAE.

Hymenium inferior in the stipitate and dimidiate, horizontal species, superior in the effused and resupinate species, bearing from the first spines, teeth, tubercles, wart-like granules, or irregular folds, either entire or more or less fimbriated at the tips; basidia in most genera tetrasporous; in one or two ill-understood genera (*Knieffia* and *Mucronella*) monosporous.

*Hydneae*, Fries, Pl. Hom., p. 80.

The majority of species are effuso-resupinate or entirely resupinate, hence the present family is lower in the scale of development of the sporophore than the *Agaricineae* and the *Polyporeae*, as in the latter the majority of species are mesopod or central stemmed, whereas the larger number of species are attached laterally, and horizontal—dimidiate.

#### ANALYSIS OF THE GENERA.

**Hydnum.**—Sporophore fleshy, with a central stem or entirely resupinate, texture compact, spines acute, distinct at the base.

**Caldesiella.**—Resupinate; texture floccose, spines acute, spores muriculate.

**Sistotrema.**—Pileate; fleshy, central-stemmed, teeth flattened, irregular, inferior.

**Irpex.**—Resupinate; teeth rather acute, springing from folds or ridges that often anastomose irregularly.

**Radulum.**—Resupinate; tubercles coarse, deformed, subcylindrical, obtuse.

**Phlebia.**—Resupinate; hymenium covered with folds or wrinkles, having the edge entire or corrugated.

**Grandinia.**—Resupinate; hymenium with crowded, globose, persistent, hemispherical, minute granules, having their apices more or less excavated.

**Porothelium.**—Resupinate; hymenium with scattered, wart-like granules, which become more or less elongated and excavated at the apices.

**Odontia.**—Resupinate; hymenium densely covered with small granules that are divided at the apices in a penicillate manner.

**Kneiffia.**—Resupinate; hymenium covered with very minute, barren, acute spinules.

**Mucronella.**—Spines slender, elongated, acute, not springing from a sporophore or subiculum.

HYDNUM. Linn. (figs. 1, 2, p. 149.)

Hymenium inferior in the higher species, superior in resupinate forms, covered with acute, awl-shaped spines that are perfectly distinct at the base. Basidia tetrasporous.

*Hydnum*, Linn., Gen. Pl., n. 968; Stev., B. Fung., p. 233.

The central genus of the *Hydneae*, distinguished from *Irpex*, its nearest ally, by having the pointed spines free at the base, that is, not originating from folds or wrinkles, but from the

plane surface of the hymenophore. We have in Britain a distinct sequence from perfectly resupinate forms to others with a central stem and inferior hymenium.

The genus *Porothelium*, hitherto included in the *Polyporeae*, belongs in reality to the *Hydneae*, the hymenium being situated on the outside of the blunt spines, as in *Hydnum*, to which genus it is closely allied, especially to those resupinate species of *Hydnum* having the spines more or less indented at the apex. *Porothelium* is distinguished by the blunt, wart-like spines that become distinctly indented at the apex.

### ANALYSIS OF THE SPECIES.

#### I. MESOPUS.

Stem central or slightly excentric, pileus fleshy, hymenium inferior.

\* Pileus fleshy, rather brittle.

\*\* Pileus corky or coriaceous.

#### II. PLEUROPUS.

Stem lateral, hymenium inferior.

#### III. MERISMA.

Very much branched or tuberculiform.

#### IV. APUS.

Sessile, dimidiate.

#### V. RESUPINATI.

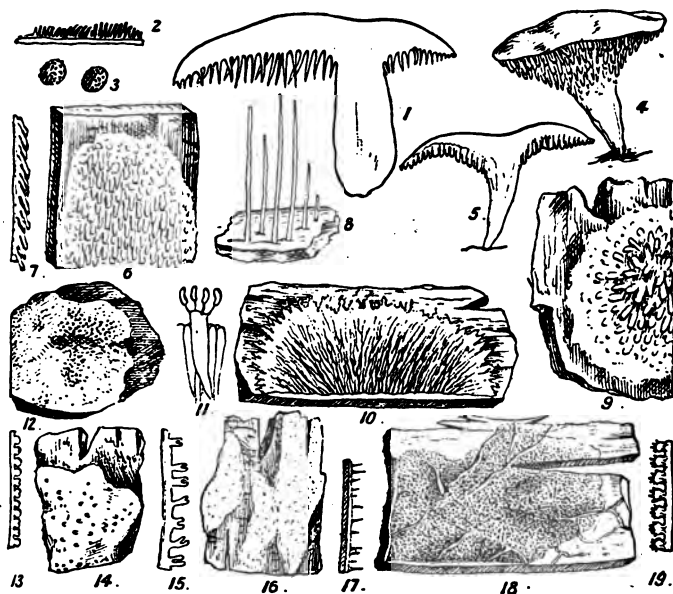
Entirely resupinate, hymenium covering the free surface.

\* Spines fuscous or ferruginous.

\*\* Spines yellowish or greenish.

\*\*\* Spines flesh-colour, lilac, or rufescent.

\*\*\*\* Spines white, often tinged with yellow or grey when old.



FIGURES ILLUSTRATING THE HYDNEAE.

Fig. 1, *Hydnum repandum*, section through the entire fungus, showing the inferior hymenium, consisting of subulate spines; stem excentric; half nat. size;—Fig. 2, *Hydnum aureum*, section showing the superior hymenium in a resupinate species; nat. size;—Fig. 3, *Caldesiella ferruginea*, spores, highly mag.;—Fig. 4, *Sistotrema confluens*, single specimen, showing the more or less jagged plate-like teeth;—Fig. 5, Section of same, nat. size;—Fig. 6, *Irpez obliquus*, portion of specimen; nat. size;—Fig. 7, Section of same, showing the unequal, more or less torn, oblique teeth; nat. size;—Fig. 8, *Mucronella calva*, showing a few of the erect, elongated teeth, springing directly from the substratum of wood, without any trace of a subiculum or resupinate layer of hyphae; nat. size;—Fig. 9, *Radulum orbiculare*, portion of a plant; nat. size;—Fig. 10, *Phlebia radiata*, portion of a plant, showing the radiating margin, and folds or wrinkles of the hymenium; nat. size;—Fig. 11, Basidium and spores of same; highly mag.;—Fig. 12, *Grandinia granulosa*; nat. size;—Fig. 13, Section of same, showing the crowded subrotund granules covering the hymenium; slightly mag.;—Fig. 14, *Porothelium confusum*, portion of plant; nat. size;—

I. MESOPUS. *With a central stem.*\* *Pileus fleshy, somewhat brittle.***Hydnum imbricatum.** Linn.

Pileus 3-4 in. across, fleshy, plane, or slightly depressed, umber, scaly; spines crowded, up to  $\frac{1}{2}$  in. long, greyish, recurrent; stem 1-3 in. long, 1-2 in. thick, even; spores broadly elliptical, minutely warted,  $6-7 \times 5 \mu$ , coloured pale yellow-brown.

*Hydnum imbricatum*, Linn., Suec., n. 1257; Stev. Fung., p. 234.

In pine woods. Flesh dirty white. There are two forms, one with a plane pileus covered with thick, persistent scales, the other with the pileus subinfundibuliform with thinner scales that eventually disappear. (Fries.)

Pileus 2-5 inches broad, thick and fleshy, plane or slightly convex, and rounded at the margin, at length somewhat hollowed in the centre, pretty regular in form, varying in colour from reddish to a kind of mouse-brown, scaly; scales imbricated, numerous, the central ones being often mere cracked portions of the pileus, which renders that part tessellated. Flesh pale, buffish, or reddish. Hymenium composed of numerous, very short, obtuse, greyish-white, entire spines of nearly equal length. Stipes central, 1-2 inches long, often above 1 inch thick, firm, irregular, whitish. No plant can be better characterised than the present one by its scaly pileus and short thick stem. (Grev.)

**Hydnum squamosum.** Schaeff.

Pileus  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. broad, fleshy, rufous-brown, smooth

Fig. 15, Section of same, showing the scattered warts that are more or less excavated or tubular at the apex (the warts are much too long in the section); slightly mag.;—Fig. 16, *Kneiffia setigera*, portion of a plant; nat. size.;—Fig. 17, Section of same, showing the minute, scattered, delicate spinules; slightly mag.;—Fig. 18, *Odontia fimbriata*, portion of a plant, showing the granular surface, more or less traversed by branched, cord-like, strands of mycelium; nat. size.;—Fig. 19, Section of same, showing the hemispherical, minute granules with penicillate apices; slightly mag.

when young, then irregularly scaly; spines greyish-brown, tips whitish; stem white, short, thinner at base; spores subglobose, 5-6  $\mu$  diam.

*Hydnum squamosum*, Schaeff., t. 273; Stev., Fung., p. 234.

On the ground amongst pines, &c. Flesh whitish, pileus smooth when young.

***Hydnum scabrosum*. Fries.**

Pileus 3-4 in. across, very fleshy, turbinate, then plane, rusty-umber, tomentose, then rough, with crowded squamules; stem about 1 in. long and thick, grey, blackish at base, equal, or thinner below; spines crowded, about  $\frac{1}{4}$  in. long, awl-shaped, rusty-brown, tips pale; spores 4-5  $\mu$  diam.

*Hydnum scabrosum*, Fr., Epicr., p. 505; Stev., Fung., p. 235.

On the ground amongst pines, &c. Flesh white, spines at first greyish brown.

***Hydnum laevigatum*. Swartz.**

Pileus 4-7 in. broad, fleshy, compact, umber, even, very smooth; spines crowded, thin, about  $\frac{1}{4}$  in. long, pale brown; stem pale brown, variable in length and thickness, often short and stout; spores 10-15  $\mu$  long.

*Hydnum laevigatum*, Swartz, in Vet. Akad. Handl., 1810, p. 243; Stev., Fung., p. 235.

On the ground in pine woods. Allied to *Hydnum fragile*, with which it was at one time included by Fries, the latter, however, is quite distinct in its softer substance, pileus at first pubescent, then rugulose, repand margin that is sometimes lobed, &c.

***Hydnum fragile*. Fr.**

Pileus 4-7 in. across, fleshy, fragile, unequal, margin waved and lobed, pale at first, then grey or often brick-red, at first pubescent, becoming smooth, but often minutely squamulose or wrinkled; flesh soft, grey, zoned; spines  $\frac{1}{4}$ - $\frac{3}{4}$  in. long, slender, fragile, whitish, then grey, scarcely decurrent; stem smooth, grey, short and thick or elongated.

*Hydnum fragile*, Fries, in Vet. Akad. Förh., 1851, p. 51; Stev., Fung., p. 235.

On the ground amongst pines, heather, &c. The pileus is

more or less distinctly zoned, and sometimes reaches a foot in diameter. Allied to *Hydnum laevigatum*; for distinction see under latter.

***Hydnum repandum*. Linn. (fig. 1, p. 149.)**

Pileus 2-6 in. across, fleshy, fragile, somewhat waved, smooth or minutely floccose; usually with the spines and stem pale, opaque yellow, sometimes with a pinkish tinge; spines crowded, 2-4 lines long, brittle; stem 2-4 in. long,  $\frac{1}{2}$ -1 $\frac{1}{2}$  thick, rather irregular; spores subglobose, apiculate, 5-8  $\mu$  diam.

*Hydnum repandum*, Linn., Suec., n. 1258; Stev., Fung., p. 236.

In woods. Subgregarious; pileus 2-4 in. broad, the margin more or less arched, very irregular in form, often excentric, or even laterally stipitate, more or less lobed or undulated, buffish or subrufescent, smooth or frequently decidedly tomentose; spines unequal, conical, entire, or sometimes bifid or lacinated, and even compressed and lamellated, sometimes forming spurious pores. Stem 1 $\frac{1}{2}$ -3 in. high, 1 in. thick, solid, paler than the pileus, sometimes clothed with white down, and at the apex with abortive spines. (Berk.)

Pileus 2-4 inches broad, more or less convex, sometimes slightly depressed, smooth, brittle, carnose, waved or sinuous, or even sublobed at the margin, spreading, very pale buff flesh-colour, occasionally reddish. Hymenium composed of fleshy, unequal, conical spines about the eighth of an inch in length, very pale, mostly entire at the apex, but sometimes lacinate, and as if tubular. Stem often not central, thick, but unequal, rarely straight, 1 $\frac{1}{2}$ -3 inches in length, solid, fleshy, paler than the pileus. Plants seldom solitary, yet scarcely gregarious. (Grev.)

***Hydnum rufescens*. Pers.**

Every part rufescent; pileus 2-3 in. broad, thin, fragile, mostly regular, pubescent; spines 2-3 lines long, equal; stem 1-3 in. long, thin, subequal.

*Hydnum rufescens*, Pers., Sym., p. 555; Stev., Fung., p. 236.

In woods. Possibly only a thin, rufescent variety of *H. repandum*.

**Hydnum acre.** Quélet.

Pileus fleshy, compact, turbinate, depressed, tomentose; yellowish-ochre, centre darker, flesh similarly coloured or greyish, fragile, bitter and rather hot; stem short, rather thick, darker than the pileus; spines greyish-yellow, tips whitish; spores globose, spinulose,  $6\ \mu$  diameter.

*Hydnum acre*, Quél., Suppl. v. p. 324, t. vi. f. 1; Sacc. Syll. vi. n. 6619.

In sandy pine and chestnut woods. Known from allied species by the hot acrid taste.

**\*\* *Pileus corky or coriaceous, tough.***

**Hydnum compactum.** Pers.

Pileus 2-6 in. across, deformed, greyish-olive or brownish, without zones, corky, compact, flesh variegated with blue; spines 1-2 lines long, brownish, tips paler; stem about 1 in. long, often deformed, brownish; spores  $6\ \mu$  diam.

*Hydnum compactum*, Pers., Syn. 556 in part; Stev., Fung., p. 236.

Amongst fir-trees, heather, &c. Often very irregular and subsessile. Pileus often with white tomentum.

Irregular, confluent, inodorous, resembling a thick, shapeless crust. Pileus 1-6 in. broad, readily imbibing moisture, clotted with down of the same colour, or dirty white. Spines equal, chestnut; stem corky, obsolete or very thick. (Fries.)

**Hydnum aurantiacum.** A. & S.

Pileus 1-6 in. across, orange-yellow, corky, compact, irregularly convex, with small protuberances, without zones, often with white tomentum, flesh zoned; spines whitish, changing to pale-brown, 1-2 lines long; stem variable,  $\frac{1}{2}$ -2 in. long, by  $\frac{1}{2}$ -1 in. thick, orange; spores 3-4  $\mu$  diam.

*Hydnum aurantiacum*, Alb. & Schw., p. 265; Stev., Fung., p. 236.

Inodorous, firm. In pine woods.

**Hydnum ferrugineum.** Fries.

Pileus 1-4 in. across, corky, soft, convex, then plane or depressed, irregularly pitted, ferruginous, at first with whitish tomentum, flesh ferruginous; spines thin, acute,



about 2 lines long, rusty-brown; stem firm, 2-3 in. long, unequal, rusty-brown; spores subglobose,  $4\ \mu$  diam.

*Hydnum ferrugineum*, Fries, S. M. i. p. 403; Stev., Fung., p. 237.

In fir woods. Often gregarious; soft when young, corky and dry at maturity.

***Hydnum scrobiculatum*. Fr.**

Entirely ferruginous; pileus 1-2 in. across, convex then plane or depressed, corky, pubescent, slightly pitted and scaly at the centre, flesh zoned; spines short (1 line), thin, fragile, decurrent; stem  $\frac{1}{2}$ - $\frac{3}{4}$  in. long,  $\frac{1}{4}$  in. thick, equal, smooth, often rooting; spores angularly globose, 3-4  $\mu$  diam.

*Hydnum scrobiculatum*, Fr., Obs. i. p. 143; Stev., Fung., p. 237.

In fir woods. Becoming pale when dry; gregarious and often confluent.

***Hydnum zonatum*. Batsch.**

Entirely ferruginous; pileus 1-2 in. across, coriaceous, thin, depressed, zoned, radiato-rugose, margin paler, thin, sterile beneath; spines 1-2 lines long, slender, acute, pale, then ferruginous; stem  $\frac{1}{2}$ -1 in. long,  $\frac{1}{4}$  in. thick, minutely squamulose, base thickened; spores globose, muriculate, pale watery brown, 4  $\mu$  diam.

*Hydnum zonatum*, Batsch., F. 224; Stev., Fung., p. 237.

In fir woods. Closely resembling *H. scrobiculatum*; distinguished by the zoned, radiato-rugose pileus and muriculate spores.

A small variety has been found at Ascot, remarkable for an appearance in the spines like that of shot silk. Spores ferruginous. (B. & Br.)

***Hydnum nigrum*. Fr.**

Pileus blackish-blue, usually without zones, margin pale; corky, rigid, convex, then depressed, tuberculose, tomentose, 2-4 in. across; flesh blackish; spines white, delicate, short; stem about 1 in. long, stout, unequal, often rooting, black without and within; spores globose, 6  $\mu$  diam.

*Hydnum nigrum*, Fries, S. M. i. p. 404; Stev., Brit. Fung., p. 238.

In pine woods. Gregarious and often confluent. Margin white when in full vigour; flesh black.

Inodorous, woody. Pileus unequal, flattened and depressed, with a whitish margin, spines slender, equal, becoming cinereous. Very distinct and easily recognised by its black, zoneless flesh. Spores white, round, papillose, diameter  $\cdot 00017$  in. In my specimens of this species the pileus is distinctly zoned, as it is in Fries' own figure in his recently published *Icones*. (W. G. Smith.)

***Hydnum graveolens*. Delast.**

With an odour like melilot. Pileus  $1-1\frac{1}{2}$  in. across, coriaceous, thin, soft, zoneless, rugulose, smooth, blackish-brown, grey when dry, margin pale, flesh brownish; spines decurrent, short, grey; stem  $1-1\frac{1}{2}$  inch long, about 1 line thick, tough, blackish-brown, polished.

*Hydnum graveolens*, Delast. in *Litt. Fr. Epicr.*, p. 509; *Stev.*, *F. Brit.*, p. 238.

In fir woods. Gregarious, retaining its scent for years.

When fresh it is extremely beautiful, being dark in the centre with a white border. The spines are pale, and the spores evidently white. The whole plant smells extremely strong of melilot, and after it has been dried three or four years the scent is as strong as ever. (B. & Br.)

***Hydnum melaleucum*. Fr.**

Pileus plane,  $1-1\frac{3}{4}$  in. across, thin, rigid, dry, irregular, striate, with little elevations at the centre, black, margin white; spines short, white; stem  $\frac{1}{2}-\frac{3}{4}$  in. long, slender, smooth, black; spores globose,  $2\cdot5-3\ \mu$  diam.

*Hydnum melaleucum*, Fries, *Syst. Myc. i.* p. 406; *Stev.*, *Fung.*, p. 238.

In fir woods. Inodorous.

***Hydnum cyathiforme*. Schaeff.**

Pileus 1-2 in. across, coriaceous, thin, plane, then deeply depressed (infundibuliform), zoned, centre somewhat tomentose, pale grey, margin white; spines white, short, crowded; stem 1 in. or more long, slender, smooth, pale grey; spores globose,  $3\ \mu$  diam.

*Hydnum cyathiforme*, Schaeffer, *t.* 139; *Stev.*, *Fung.*, p. 239.

In fir woods. Gregarious and commonly confluent or growing into each other.

## II. PLEUROPUS. *Stem lateral.*

### *Hydnum auriscalpium.* Linn.

Pileus  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, thin, dark brown, hairy, reniform; stem very slender, 2–3 in. long, dark, rooting; spines crowded, 2–3 lines long, dark; spores subglobose,  $5 \times 4 \mu$ .

*Hydnum auriscalpium*, Linn., Suec., n. 1260; Stev., Fung., p. 239.

On fir cones; amongst fir leaves, &c.

Pileus  $\frac{1}{2}$ –1 in. broad, subrotund, thin coriaceous, often somewhat lobed, the margin of the pileus entire, more or less zoned, tomentose, purplish or reddish-brown, sometimes pale; spines subcinereous, or a dilute shade of the pileus, the tips often darker, but not always so, more or less hoary from the spores. Stem buried to some depth amongst fir leaves, 2–3 in. high, often confluent, slender, dark-brown, tomentose, attached by a shaggy or spongy base. (Berk.).

Pileus roundish, about  $\frac{3}{4}$  in. in breadth, nearly plane, or somewhat convex, entire at the margin, of a leathery substance; surface tomentose, obscurely zoned; colour purplish-brown. Spines of the hymenium generally paler than the pileus, darkest at their apex, which is entire. Stipes often branched at the base, 2–4 in. long, erect, lateral, cylindrical, tomentose, brown, terminating in a shaggy root, which is always fixed to the cone of some species of fir. (Grev.)

## III. MERISMA. *Very much branched, or tuberculiform.*

### *Hydnum coralloides.* Scopoli.

Pure white, yellowish with age, entirely broken up into tapering interlaced branches; branches  $\frac{1}{2}$  in. thick or more at the base, about 1 line at the tip; spines growing from one side of the branches, pendulous, 3–6 lines long, awl-shaped, entire; spores globose, 4–6  $\mu$  diam.

*Hydnum coralloides*, Scop., Carn., 2, p. 472; Stev., Fung., p. 239.

On decayed wood, fir, beech, &c. A very beautiful plant, somewhat resembling a coral, or as some say, a cauliflower, 6 in. to half a yard across.

When old it forms tufts, a foot or more in length, with flexuous, angular branches, beset with incurved ramuli, bearing spines on the under side. (Cooke.)

**Hydnum erinaceum.** Bull.

Pileus 2-8 in. across, white, then yellowish, elastic, irregularly tuberculose, pendulous, fibrillose; spines crowded, straight, pendulous, pale, 1-2½ in. long; spores subglobose, smooth, 5-6  $\mu$  diam.

*Hydnum erinaceum*, Bulliard, t. 34; Stev., Fung., p. 449.

On trunks, oak, beech, &c. Internally lacunose, sometimes with an indistinct lateral stem.

Pileus a span or more broad, the base projecting, soft, torn into subfasciculate fibrillae (abortive spines); margin obtuse, gradually giving out true spines, often imbricated with smaller pilei; spines 1½-2½ in. long, pendulous, thick set, very regular, soft, equally attenuated, connected two or three together at their bases, fastigate; substance thick, tough, fleshy, very soft, elastic, white, not changing colour. (Fries.)

States occur, depending probably on situation, with densely anastomosing branches, stemless, or with a horizontal stem. (Berk.)

**Hydnum caput-medusae.** Bull.

Pileus fleshy, 3-4 in. diameter, white, becoming dingy grey, tuberculiform, tapering to a stem-like base, covered all over with spines, those on the upper surface distorted, those on the under side ½-¾ in. long, straight.

*Hydnum caput-medusae*, Bull., t. 412; Stev., Fung., p. 240.

On trunks. Distinguished by the presence of spines on every surface of the pileus.

Large and fleshy, at first snowy-white, then dingy cinereous; stem dilated into the pileus; all the spines at first straight, slender, long, the upper ones at length bent and contorted. (Cooke.)

IV. APUS. *Sessile, dimidiate.***Hydnum cirrhatum.** Pers.

Pileus 2-4 in. across, simple or imbricated, fleshy, colour variable, white, pale yellow, or with a reddish tinge, attached by a broad lateral surface, expanded; the upper surface with long, curled, abortive spines; spines equal, thin, rather tough, pale,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long; spores globose, 3  $\mu$  diam.

*Hydnum cirrhatum*, Persoon, Syn., p. 558; Stev., Fung., p. 240.

On trunks of various trees.

**Hydnum diversidens.** Fries.

Pileus 2-3 in. across, fleshy and irregularly tuberculose or lobed, sometimes substipitate, whitish or yellowish, upper surface with erect, irregularly-notched teeth; the margin clothed with club-shaped processes; under surface with simple awl-shaped, regular spines, 3-6 lines long.

*Hydnum diversidens*, Fries, S. M. i. p. 411; Stev., Fung., p. 240.

On beech, hornbeam, birch, &c. Remarkable for the three forms of teeth. Often very irregular in form.

**Hydnum ochraceum.** Pers.

Pilei 1-3 in. across, thin, coriaceous, zoned, ochraceous, effuso-reflexed or entirely resupinate; spines very minute, ochraceous with a pink tinge; spores subglobose, 5  $\mu$  diam.

*Hydnum ochraceum*, Pers., Syn., p. 559; Stev., Fung., p. 241.

On dead branches. Readily separable from the matrix. Intermediate between the dimidiate and truly resupinate species.

V. RESUPINATI. *Entirely resupinate.*

\* *Spines fuscous or ferruginous.*

**Hydnum squalinum.** Fr.

Subiculum pale wood-colour, firm, coriaceous, thick, suborbicular, 2-3 in. across; spines crowded, stout, compressed, ferruginous, then brownish, 3-4 lines long.

*Hydnum squalinum*, Fries, S. Myc. i. p. 420; Stev., Fung., p. 241.

On trunks. Not collected during recent years; admitted on the authority of the figures of Ray and Bolton.

**Hydnum membranaceum.** Bull.

Subiculum thin, smooth, closely adnate, effused for 1-2 inches; spines awl-shaped, crowded, equal, about 1 line long, acute, and like the subiculum, tawny ferruginous.

*Hydnum membranaceum*, Bull., t. 481; Stev., Fung., p. 242.

On fallen branches. Sometimes paler and yellowish, spines often arranged in little groups, pale then brown.

A glandular appearance on the upper part of the spines is figured by Bulliard and Sowerby. The specimen represented by Sowerby is cracked into little areolae, each of which bears a fascicle of spines. (Berk.)

**Hydnum molluscum.** Fries.

Subiculum membranaceous, dry, readily separable from the matrix, whitish; teeth short, slender, reddish.

*Hydnum molluscum*, Fries, Summa Veg. Scand., p. 327 (note).

*Hydnum membranaceum*, Berk., Exs., n. 142.

On wood. Distinguished from *H. membranaceum* by readily separating from the matrix, and by the white subiculum.

**Hydnum Weinmanni.** Fr.

Subiculum thin, closely adnate, smooth, buff, with a grey tinge; spines rather distant, minute, acute, equal, not 1 line long, coloured like the subiculum.

*Hydnum Weinmanni*, Fries, Ele-ch., p. 136; Stev., Fung., p. 242.

On fallen branches and rotten wood. Effused for 1-2 inches, grey when dry. Most general on poplar branches, according to Fries.

Allied to *Hydnum membranaceum*; very broadly effused, not cracked; excepting the spines, quite even, very smooth, as is also the margin; not truly innate with the matrix, but appearing as if adglutinated. With the habit of a young specimen of *Thelephora livida*. Spines not crowded, short, but acute, slender, all equal, and up to the present I have always seen them straight. Colour peculiar, sordid. (Fries.)

**Hydnum crinale.** Fries.

Subiculum effused for 1-2 in.; very thin, texture fibrillose, umber, or with a rusty tinge; spines very thin and slender, hair-like, crowded, 2 lines long or more, umber with rusty tinge.

*Hydnum crinale*, Fries, *Epicr.*, p. 516; *Stev.*, *Fung.*, p. 242.

On dead wood. Distinguished by the crowded hair-like spines.

**Hydnum varicolor.** Fr.

Subiculum white, forming a furfuraceous, adnate, inseparable crust, spreading for 1-2 inches; spines very minute, crowded, conical, unequal, brownish, usually more or less closely adpressed to the subiculum; spores subglobose, 3-4  $\mu$  diam.

*Hydnum varicolor*, Fries, *Epicr.*, p. 516.

On trunks, especially oak.

**\*\* Spines yellowish or greenish.**

**Hydnum aureum.** Fries. (fig. 2, p. 149.)

Every part golden yellow; subiculum determinate, circumference with radiating tooth-like processes; subcartilaginous, smooth; spines about 1 line long, awl-shaped, crowded; spores subglobose, muriculate, 4-5  $\mu$  diam.

*Hydnum aureum*, Fr., *Elench.*, p. 137; *Stev.*, *Fungi*, p. 243.

On dead branches. Mycelium penetrating the wood, and forming a yellowish circumscribing zone.

**Hydnum denticulatum.** Pers.

Subiculum longitudinally effused, often for several inches, rather mealy, bright yellow; spines same colour, crowded, slightly toothed here and there.

*Hydnum denticulatum*, Pers., *Myc. Eur.*, p. 181; *Stev.*, *Brit. Fung.*, p. 243.

On rotten wood.

**Hydnum alutaceum.** Fr.

Subiculum longitudinally effused for several inches, crustose, inseparable, margin naked, pale ochraceous; spines similarly coloured, minute, crowded, unequal, acute.

*Hydnum alutaceum*, Fries, Syst. Myc. i. p. 417; Stev., Fung., p. 243.

On dead wood. Resembling *Grandinia granulosa* in colour and general appearance, but quite distinct in the acute spines.

***Hydnum sordidum*. Weinm.**

Subiculum effused, often for many inches, thin, readily separating from the matrix, subgelatinous, dingy yellow, margin irregularly porous, sulphur-yellow; spines very much crowded, often fasciculate, compressed, incised, sub-acute, 1-1½ lines long.

*Hydnum sordidum*, Weinmann, Rossic., p. 70; Stev., Fung., p. 243.

On rotten wood.

***Hydnum viride*. Fr.**

Subiculum broadly effused, softly tomentose, green, becoming yellowish with age; spines straight, about 1 line long, rather thick, irregular, more or less toothed, green.

*Hydnum viride*, Fries, Syst. Myc. i. p. 421; Sacc., Syll., vi. n. 6794.

On rotten wood. Often extending in patches 8-10 in. long.

***Hydnum limonicolor*. B. & Br.**

Adnate, bright citron-yellow; spines crowded, acute, short; mycelium white, scanty or almost obsolete.

*Hydnum limonicolor*, B. & Br., Ann. Nat. Hist., n. 1686; Stev., Brit. Fung., p. 244.

On a stone buried amongst pine leaves. Distinguished from its nearest ally, *Hydnum sepultum*, in the exceedingly scanty subiculum and the absence of a persistent, white, barren margin.

***Hydnum spathulatum*. Fr.**

Subiculum yellowish-white, effused, membranaceous, separable, circumference fimbriated, under surface villous; spines spathulate, oblique, orange; spores colourless, broadly elliptical, apiculate,  $8 \times 5 \mu$ .

*Hydnum spathulatum*, Fries, Hym. Eur., p. 614; Stev., Brit. Fung., p. 244.



*Sistotrema spathulata*, Sz., Car., n. 993.

On decaying wood. Forming patches 1-2 in. across, spines 1-2 lines long. In some specimens flattened and acicular spines are mixed.

Spines, however, scarcely orange, yet agreeing with authentic specimens from Schweinitz; separable. (Berk.)

**Hydnum multiforme.** B. & Br.

Very pale buff or whitish, at first even and resembling a *Corticium*, at length producing spines here and there, often in clusters, either acute or more or less flattened and fimbriated; spores colourless, subglobose or very broadly pip-shaped, obliquely apiculate,  $9 \times 6-7 \mu$ .

*Hydnum multiforme*, Berk. & Broome, Ann. Nat. His., n. 1687; Stev., Brit. Fung., p. 244.

On dead wood. Rather broadly effused, inseparable, margin often thin and indeterminate, waxy and becoming cracked when dry. It is almost certain that the present species is a true *Corticium*, the hymenium is produced on the plane, waxy surface, and not on the spines, which are in some portions of the type specimen absent altogether, and when present, are sterile, irregular, and altogether morbid productions, from 1-2 lines in length.

**Hydnum anomalum.** B. & Br.

Pallid light yellow; stratum thin, gelatinous; teeth in the form of granules, then stipitate and obtusely divided upwards; spores globose, shortly pedicellate.

*Hydnum anomalum*, Berk. & Broome, Ann. Nat. Hist., n. 1438, with fig.; Stev., Brit. Fung., p. 244.

In the inside of a very rotten ash-tree. Substance of teeth tough, with large ovate or globose vesicles immersed in it. (B. & Br.)

I cannot find a trace of anything like the above on the piece of wood that represents the type specimen. Apparently not a good *Hydnum*; may possibly prove to be a resupinate form allied to *Tremellodon*, and the ovate or globose vesicles in the spines to be basidia.

**Hydnum melleum.** B. & Br.

Honey-colour, effused, thin, teeth acute, sometimes divided

at the apex, basal portion along with the subiculum pulverulent; spores colourless, cylindrical,  $7-10 \times 2.5 \mu$ .

*Hydnum melleum*, B. & Br., Ann. Nat. Hist., n. 1436; Stev., Fung., p. 244.

On fallen rails. Forming an exceedingly thin honey-coloured film, margin minutely byssoid. Spines about 1 line long, often scattered, stout and blunt or slender and acute, or again, blunt and divided at the apex. At best but a doubtful species of *Hydnum*.

***Hydnum sepultum*. B. & Br.**

Resupinate, golden-yellow, margin white; spines acute, medium-sized; spores globose,  $5 \mu$  diameter.

*Hydnum sepultum*, B. & Br., Ann. Nat. Hist., n. 1813; Stev., Fung., p. 244.

On stones buried amongst pine leaves. Forming little scattered patches; spines about 1 line long. Distinguished from other resupinate yellow species by the persistent, white, sterile margin and the globose spores.

\*\*\* *Spines flesh-colour, lilac or rufescent.*

***Hydnum udum*. Fr.**

Flesh-colour, then pale yellowish, subgelatinous, effused for several inches; spines crowded, unequal, about 1 line long, awl-shaped or compressed, simple or toothed, coloured like the subiculum.

*Hydnum udum*, Fries, Syst. Myc. i. p. 422; Stev., Fung., p. 245.

Forming elongated, dingy, subgelatinous expansions on dead branches; not separable from the wood. Forming elongated patches 4-5 in. long. My specimens agree with Fries' character in every respect, except that most of the spines are simple. When dry it is yellowish towards the margin, the more central parts being of a pale fawn colour. (Berk.)

***Hydnum bicolor*. A. & S.**

White, effused for many inches, very thin, inseparable; spines about half a line long, basal portion villous, white, tips dark brown, smooth.

*Hydnum bicolor*, Albertini & Schweinitz, p. 270; Stev., Brit. Fung., p. 245.

On pine wood, &c.

At first sight might be easily confounded with reddish form of *Hydnum farinaceum*, but when examined in the living condition is seen to be altogether distinct. Subiculum very thin, innate, slightly flocculose; colour of the entire fungus when living, reddish-white. (Fries.)

\*\*\*\* *Spines white, often tinged yellow or grey when old.*

***Hydnum nodulosum*. Fr.**

Whitish, smooth, inseparable, very broadly effused, nodulose; spines long, on the flat portions depressed, on the lower surface of the nodules pendulous, upper side of nodules barren.

*Hydnum nodulosum*, Fries, Hym. Eur., p. 616; Stev., Fung., p. 245.

On trunks, fir stumps, &c. Often very broadly effused, nodules variable in size, sterile above, bearing pendulous elongated spines on the surface pointing to the ground.

***Hydnum Stevensoni*. B. & Br.**

White, effused, mealy beneath, here and there byssoid; spines cylindrical, obtuse or truncate, sometimes compressed, pulverulent at the apex; spores subglobose, apiculate, colourless, 3-4  $\mu$  diameter.

*Hydnum Stevensoni*, B. & Br., Ann. Nat. Hist., n. 1437; Stev., Fung., p. 246.

On dead wood. Often effused for 2-3 in., very thin, byssoid or pulverulent; spines rather crowded, sometimes several more or less confluent at the base, variable, about  $1\frac{1}{2}$  line long. Sometimes spreading from the wood and encrusting mosses, leaves, &c.

***Hydnum niveum*. Pers.**

White, effused for 2-3 in., very thin, inseparable, margin byssoid; spines crowded, short, equal, glabrous.

*Hydnum niveum*, Pers., Disp., t. 4, f. 6-7; Stev., Fung., p. 246.

On dead wood.

Distinguished by the beautiful white colour when growing, becoming pallid when dry. Subiculum thin; 2-3 inches or more across, spines minute, subacute, glabrous. Persistent. (Fries.)

**Hydnum farinaceum.** Pers.

White; subiculum effused, indeterminate, forming thin, mealy, crustose patches; spines thin, rather distant, very acute, quite entire.

*Hydnum farinaceum*, Pers., Syn., p. 562; Stev., Fung., p. 246.

On rotten wood, especially pine. Forming thin effused patches resembling scattered meal, beset with distant acute spines. Sometimes yellowish.

A form, evidently of this species, with a most beautifully branched byssoid margin, spreading several inches on fallen decayed branches. Subiculum effused, consisting of a very delicate inseparable byssoid membrane, closely applied to the wood and following all its irregularities, the margin most beautifully radiated and barren; the fertile parts sprinkled with a thin farinaceous stratum, from which spring acute white teeth, which are sometimes nearly straight. (Berk.)

**Hydnum argutum.** Fr.

White, subiculum effused, vague, in scattered patches, consisting of loosely interwoven hyphae; spines awl-shaped, acute, unequal, minutely toothed; spores subglobose, 7-8  $\mu$  diam.

*Hydnum argutum*, Fries, Syst. Myc. i. p. 424; Stev., Fung., p. 246.

On wood and bark. Distinguished by the loose texture of the subiculum, thus approaching *Caldesiella*.

**Hydnum stipatum.** Fr.

Whitish. Often very broadly effused, very thin, minutely pulverulent, forming an inseparable crust; spines crowded, blunt, granule-like, minutely toothed.

*Hydnum stipatum*, Fries, Syst. Myc., p. 425; Stev., Brit. Fung., p. 246.

On rotten wood. Often forming very broadly effused

patches. Sometimes pale dingy yellow. The margin is either sterile or covered with spines. Colour sometimes pale yellowish or very pale buff.

**CALDESIELLA.** Sacc. (fig. 3, p. 149.)

Spines minute, conical or ampulliform, springing from a membranaceous, persistent villose subiculum; spores globose, muriculate, copious.

*Caldesiella*, Saccardo, Mich. i. p. 7; Sacc., Syll. vi. p. 477.

Distinguished from *Hydnum* by the muricate spores being very copious, and by the loose texture of the subiculum.

Resembles the teeth of a *Hydnum* in the subiculum of *Hypochnus* or *Coniophora*. I have had no opportunity of examining the species included in the present genus in a fresh state, hence cannot say definitely whether the fungus is a true Basidiomycete or not, that is, whether the spores are borne on true basidia, or singly at the tips of unthickened branches, as in the family Hyphomycetes. The profusion of spores points to the latter; this, however, must be settled by some one examining fresh material.

***Caldesiella ferruginosa.*** Sacc. (fig. 3, p. 149.)

Subiculum effused, often for several inches, tawny-ferruginous, tomentose; spines crowded, conico-subulate, acute, coloured like the subiculum, straight or oblique and compressed; spores globose, 8-9  $\mu$  diameter, distinctly muriculate, dingy olive.

*Caldesiella ferruginosa*, Sacc., Mich. ii. p. 303.

*Hydnum ferruginosum*, Fries, Syst. Myc. i., p. 416; Stev., Fung., p. 242.

On decaying wood, especially under the bark; rarely on the ground. Separable from the matrix.

The whole plant consists of densely-woven down, forming an effused indeterminate mass, the hymenium composed of erect or oblique spines, which are villous and often abortive, so as easily to be taken for some species of the sub-order *Hyphomycetes*. The colour varies from ferruginous to brownish. (Berk.)

## SISTOTREMA. Pers. (figs. 4, 5, p. 149.)

Fleshy. Hymenium inferior, interruptedly lamelloso-dentate, rather waxy, irregularly scattered (not radiating), readily separating from the pileus. Basidia tetrasporous.

*Sistotrema*, Persoon, Syst. Myc. i. p. 426; Cke., Hdbk., p. 302.

Allied to *Irpe*x, but distinguished by the irregularly-toothed gills disposed without order, and readily separating from the pileus.

*Sistotrema confluens*. Pers. (figs. 4, 5, p. 149.)

Pileus fleshy, irregular, horizontal, villous, white, then yellowish or tinged with brown, subdepressed,  $\frac{3}{4}$ –1 in. across, several pilei often grown together; gill-like plates entire or toothed; stem about 1 in. high, often somewhat excentric, becoming thinner downwards; spores colourless, elliptical,  $3 \times 1.5 \mu$ .

*Sistotrema confluens*, Persoon, Syn. Fung., p. 551; Cke., Hdbk., p. 302.

On the ground. Gregarious, often anastomosing or two or three growing into each other, scentless, brittle, whitish, at length yellowish or tinged with brown. Stem attenuated below, central or lateral, about an inch high. Pileus about 1 in. broad, somewhat depressed. Tooth-like plates of the hymenium entire or jagged. (Grev.)

## IRPEX. Fr. (figs. 6, 7, p. 149.)

Hymenium inferior, toothed from the first, teeth continuous with the pileus, acute, smooth, connected at the base by slightly-raised folds arranged in a gill-like manner (in sessile species), or like honeycomb (in resupinate species). Basidia tetrasporous.

*Irpe*x, Fries, Elench., 142; Stev., Fung., p. 248.

Distinguished from *Hydnum* by having the spines connected at the base. The spines in the present genus also differ from those of *Hydnum* in not being so uniformly awl-shaped or cylindrical, with a tapering pointed tip.

Hymenium inferior, at first toothed, teeth variable, firm,

somewhat coriaceous, acute, entirely concrete with the pileus, placed in rows, or netted and connected at the base into lamellae, or porous folds. Lignatile fungi, rather coriaceous, approaching *Lenzites* and *Daedalea*, but the hymenium is toothed from the first, the teeth not lacerated. (Fries.)

***Irpex pendulus*. Fr.**

Pilei membranaceous, elastic, plicate, minutely squamuloso-pilose, pale yellow, free above and pendulous; teeth in irregular rows, about 1 line long, more or less incised, shining white.

*Irpex pendulus*, Fries, Elench., p. 143; Stev., Fung., p. 249.

On pine wood. More or less circular, thin, 1-1½ in. across, extended behind and pendulous.

Pileus 1 in. or more broad, very thin, somewhat resembling paper, capable of being folded up or stretched, concrete or infundibuliform, from a stem-like base, clothed with long, even, pilose scales, so closely pressed that the whole surface appears slightly rugulose; spines distinct, chiefly seated on the produced base, which is at length brownish, various in form, generally arranged in rows. (Fries.)

***Irpex spathulatus*. Fries.**

Broadly effused, inseparable, whitish, margin byssoid, becoming defined; teeth compressed or spathulate, 2-3 lines long, coarse, springing from reticulately arranged folds.

*Irpex spathulatus*, Fries, Elench., p. 146; Stev., Fung., p. 250.

On larch, &c. Not porous, teeth large and compressed, often buff when dry. Often effused for several inches.

***Irpex obliquus*. Fr. (figs. 6, 7, p. 149.)**

White or pallid, broadly effused, inseparable, margin byssoid; teeth oblique, thin, compressed, incised or torn, 2-3 lines long, rather crowded, springing from reticulately arranged folds.

*Irpex obliquus*, Fries, Elench., p. 147; Stev., Fung., p. 250.

On stumps, dead branches, &c. Effused for several inches, superficially resembling some forms of *Poria vaporaria*, where the pores are torn, but coarser.

This spreads in irregular patches on the surface of decaying wood. The pores for a small space round the margin are round and distinct, but towards the centre are greatly

lengthened out, lying one upon another in an imbricated manner. The colour is white at first, when old it changes to a yellow-brown, and at last to a dirty, fuscous black. (Bolton.)

***IrpeX carneus*. Fr.**

Reddish, thin, effused, cartilagineo-gelatinous, 1-3 in. long; teeth obtuse, awl-shaped, entire, united at the base.

*IrpeX carneus*, Fr., Hym. Eur., p. 622; Stev., Fung., p. 250; Fries, Elenchus, p. 148.

On wood and bark. Fries places the present species in *IrpeX* with a query; it is placed in *Radulum* by Fuckel.

***IrpeX Johnstoni*. Berk.**

Resupinate, 1-2 in. long, pure white, thin, separable, circumference naked; teeth compressed, unequal, crowded, in irregular rows, 1 line or more in length.

*IrpeX Johnstoni*, Berk., Outl., p. 262; Stev., Fung., p. 250.

On dead beech, &c. Closely resembling a *Hydnum*, but careful examination shows that the teeth spring from fine folds.

Two inches long, effused, with the margin reflexed all round, and the teeth exactly resembling those of many true species of *Hydnum*, but on minute inspection, they will be found to be seated on fine folds, and disposed in rows. (Berk. and Broome.)

***IrpeX deformis*. Fr.**

White, effused, thin, adnate, margin byssoid; teeth rather crowded, awl-shaped, springing from folds that form small shallow pores, more or less incised, 1-2 lines long.

*IrpeX deformis*, Fries, Elench., p. 147; Stev., Fung., p. 250.

On wood. Effused for several inches, resembling a *Polyporus* with the pores torn into shreds almost to the base, if indeed it is in reality anything more.

***IrpeX fusco-violaceus*. Fr.**

Pileus often broadly elongated, effuso-reflexed, coriaceous, thin, zoned, silky, greyish; teeth in irregular rows, plate-like, incised at the apex, violet-brown.

*IrpeX fusco-violaceus*, Fr., Elench., p. 144; Stev., B. Fung., p. 249.



On pine trunks, which are sometimes nearly covered; sometimes wholly effused, becoming pale with age.

It is open to doubt as to whether the present species is not a form of *Polystictus abietinus*.

**RADULUM. Fr. (fig. 9, p. 149.)**

Sporophore resupinate, vaguely effused; hymenium tuberculose; tubercles distinct at the base, coarse, commonly elongated, deformed, obtuse, mostly waxy; basidia tetrasporous, present on smooth surface of hymenium as well as on the tubercles.

*Radulum*, Fries, *Elenchus*, p. 149; Stev., *Fung.*, p. 251.

Growing on wood, and frequently bursting through the bark. Distinguished amongst allies by the large, deformed, elongated, obtuse tubercles.

The spores are of value in determining the species in some instances, when external characters leave the matter uncertain.

\* *Superficial and exposed from the first; very variable.*

***Radulum pendulum*. Fr.**

Longitudinally effused for 1-3 in. or more, whitish, upper margin shortly reflexed, substance thick, softly coriaceous; hymenium inferior, tubercles elongated about 2 mm. long, irregular, pendulous; spores globose, 3  $\mu$  diam.

*Radulum pendulum*, Fr., *Elench.*, p. 149; Sacc., *Syll. vi. n.* 6928.

On alder and birch, bursting through cracks in the bark; also on pine wood.

***Radulum orbiculare*. Fr. (fig. 9, p. 149.)**

Suborbicular, several often becoming confluent, white, then tinged dull yellow, glabrous, margin byssoid; tubercles subterete, variously scattered or fasciculated, 2-3 mm. long; during the second season the colour is often dingy flesh-colour; spores cylindric-oblong, slightly curved, 10  $\times$  5  $\mu$ .

*Radulum orbiculare*, Fr. *Elench.*, p. 149; Stev., *Fung.*, p. 251.

On dead bark of various trees. Patches 1-6 in. across, closely adnate, thickness variable, tubercles often adpressed or pendulous.

Very variable, generally originating beneath the epidermis; 2-3 in. broad, quite membranaceous or above 2 lines thick, margin byssoid, occasionally showing a disposition to become reflexed; hymenium consisting of irregularly disposed, oblique or erect, tooth-like, obtuse, entire or lacinated, often fasciculate tubercles; the apices sometimes somewhat tomentose. Occasionally they are much scattered and almost resemble spines. (Berk.)

Pileus entirely resupinate, one to several inches in diameter, at first circular, afterwards irregular and often confluent, of a white colour, mostly changing (especially in the centre) to a pale orange-yellow; margin filamentous, radiating, somewhat raised, or rather thickened. Hymenium composed of processes, irregularly distributed over the surface of the pileus, and more or less distinct. They are singularly variable in their form, but are mostly 2-3 lines in length, slightly compressed, and somewhat broader at the apex than at the base. Often several are confluent, and altogether deformed. At their apex they are generally entire, and sometimes naked, but more frequently villose. In regard to direction, I have seen them both erect and oblique, or even closely adpressed. (Grev.)

**Radulum quercinum.** Fr.

Closely adnate subrotund, then irregularly and broadly effused for several inches; white, then pallid or with a flesh tinge, sometimes; tubercles stout, 2-3 lines long, often fasciculate, apex minutely spinulose; spores broadly elliptical with an oblique apiculus,  $7 \times 5 \mu$ .

*Radulum quercinum*, Fries, *Epicr.*, p. 525; Stev., *Fung.*, p. 494.

On dead wood. Distinguished by the villose or spinulose tips of the tubercles and the spores. The above measurements are from a specimen from Fries in Berkeley's herbarium. Often confounded with species of *Irpex* in herbaria.

Adnate, persistent, 2-3 in. long, according to Fries, but Berkeley has seen specimens as follows: sometimes a foot or more broad, white when young, then yellowish rufous,

membranaceous, composed of the finest down, margin byssoid, pure white.

**Radulum tomentosum. Fr.**

Effused irregular for 1-3 in., rather thick, innate, whitish, margin more or less free and erect, distinctly tomentose; tubercles short, crowded, irregular, subangular and often confluent, smooth; spores cylindric-oblong, slightly thinner, curved, and apiculate at the base,  $8 \times 4 \mu$ .

*Radulum tomentosum*, Fr., Epicr., 525; Stev., Fung., p. 252.

On Pyrus, Salix, &c., also on pine sawdust. Distinguished by the peculiarly-shaped spores and the tomentose margin, which is sometimes brownish when dry.

**Radulum deglubens. B. & Br.**

Orbicular, about  $\frac{1}{4}$  in. across, margin broadly free and upturned, smooth below, flesh-colour with rust tinge, diaphanous, sub-cartilaginous and rigid when dry; tubercles about 1 line long, very irregular, scattered, cylindrical or compressed, plate-like and toothed, interstices mealy with the white spores, which are cylindric-oblong, ends obtuse,  $14-16 \times 7-8 \mu$ , often slightly curved.

*Radulum deglubens*, B. & Br., Ann. Nat. Hist., n. 1440; Stev., Fung., p. 252.

On ash. Described from Berkeley's type specimen.

**Radulum corallinum. B. & Br.**

Effused for 2-3 in., whitish, very thin and pelliculose, shining, sterile portions flaking off, tubercles in scattered fascicles  $\frac{1}{2}-1$  in. across, very irregular, coralloid, 2-3 lines long; spores subglobose, apiculate, about  $5 \mu$  diam.

*Radulum corallinum*, B. & Br., Ann. Nat. Hist., n. 1441; Stev., Fung., p. 252.

On oak branches. Remarkable for the very thin, shining subiculum, producing isolated, coral-like clusters of very irregular, crowded tubercles.

**Radulum pileucum. B. & Br.**

Effused for several inches, very thin, entirely adnate; subiculum white, mucedinous; hymenium waxy, polished, pale ochraceous; tubercles sparsely scattered, variable in

size, up to 2 lines in length, apex often fimbriated, brittle; spores cylindrical, slightly curved,  $6-7 \times 3-3.5 \mu$ .

*Radulum epileucum*, B. & Br., Ann. Nat. Hist., n. 1442; Stev., Fung., p. 252.

On decorticated wood. Distinguished by the thin, even, polished, pale ochraceous surface and the much scattered tubercles.

**\*\* Innate, i.e., developing below the bark, which is pushed off.**

*Radulum fagineum*. Fr.

Broadly effused, inseparable, removing the bark, whitish, the margin often broad, sterile, densely velvety and rusty-orange; tubercles irregular in form and size, entire and obtuse, or variously toothed and acute, subiculum rather thick, soft and spongy, and often irregularly pitted or porose; spores cylindrical, slightly curved,  $11-12 \times 6 \mu$ .

*Radulum fagineum*, Fries, Elenchus, p. 152; Stev., Fung., p. 252.

On dead beech. Surrounding the branches and resembling stalactite. Becoming dingy pale ochraceous with age.

*Radulum aterrimum*. Fr., Hym. Eur., p. 624; Stev., Brit. Fung., p. 253.

*Hydnum erectum*, Sow., Herb.

This fungus is not a *Radulum*, and does not even belong to the Basidiomycetes.

PHLEBIA. Fr. (figs. 10, 11, p. 149.)

Resupinato-effused, hymenium covering the entire free surface, rather soft, subgelatinous, from the first covered with crowded, irregular wrinkles or ridges that have the edge usually quite entire, everywhere covered with tetrasporous basidia.

*Phlebia*, Fr., Syst. Myc. i. p. 426; Stev., Fung., p. 253.

Subgelatinous when moist, cartilaginous when dry, known from other resupinate genera as *Corticium*, &c., by the crowded, irregularly interrupted small wrinkles or folds that cover the hymenium.

**Phlebia merismoides.** Fr.

Broadly effused, thin, tremelloid when fresh, flesh-colour, then with dingy, purple tinge; even or irregular when incrusting, margin strigose, orange, with white down on the under surface; wrinkles of hymenium crowded, never forming pores or reticulations; spores  $3 \times 1.5 \mu$ .

*Phlebia merismoides*, Fries, Syst. Myc. i. p. 427; Stev., Brit. Fung., p. 253.

On trunks; running over moss, &c., 1-3 in. across.

Pileus carnose, not a line in thickness, either growing upon the bark itself, or (more frequently) spreading for two or three inches over the mosses upon it, especially near the ground; often completely enveloping their stems, in which state it bears no inconsiderable resemblance to a stalactite incrustation. The colour is more or less orange, or red; that in the centre being more and more dull as the plant grows older, but the margin is delicate and very bright; beneath the pileus is whitish and downy. The surface of the hymenium partly depends upon the subjacent body; but it is always either more or less tuberculated or folded; when growing on mosses, the folds or rugae often pass into prominent somewhat elongated papillae; when the subjacent surface is plane, the rugae are more perfectly developed, and pass towards the circumference in a tolerably direct manner. The margin is byssoid. (Grev.)

**Phlebia radiata.** Fr. (figs. 10, 11, p. 149.)

Reddish-flesh colour or almost orange, thin, subrotund, glabrous on both surfaces, margin with radiating tooth-like processes; folds or wrinkles more or less straight and radiating; spores cylindric-oblong, curved,  $4-5 \times 1-1.5 \mu$ .

*Phlebia radiata*, Fries, Syst. Myc. i. p. 427; Stev., Brit. Fung., p. 254.

On dead wood, bark, &c. Patches reaching to 3 in. or more across, thin, bright-coloured.

Between fleshy and membranaceous, tough; at first orbicular, then dilated, confluent, 1-3 in. broad, margin free, smooth, but beautifully fibroso-radiated. Folds radiating from the centre, short, interwoven, very close. (Fries.)

One of the specimens gathered by Captain Carmichael is four inches long and appears to have been originally still

longer. In this the character of the radiated margin is entirely lost and the folds are very short, so as to resemble blunt compressed teeth; but there is still something like order visible in their disposition. (Berk.)

**Phlebia contorta.** Fr.

Effused, rather firm, smooth on both surfaces, margin indeterminate; wrinkles of the hymenium often branched, waved, and irregularly arranged; dingy flesh-colour, then brownish; spores cylindric-oblong, curved,  $3-5 \times 1-1.5 \mu$ .

*Phlebia contorta*, Fr., Syst. Myc. i. p. 427; Stevenson, Brit. Fung., p. 254.

On decaying wood. Closely allied to *P. radiata* and distinguished chiefly by the irregularly arranged, contorted folds.

**Phlebia vaga.** Fr.

Effused, closely adnate, margin fibrillose or byssoid, of a dirty yellowish shade, hymenium greyish-yellow, or sometimes with a dingy lilac shade; wrinkles slender, waved and intricately interwoven, when in perfect condition covered with granules; spores  $3-4 \times 1-2 \mu$ .

*Phlebia vaga*, Fries, Syst. Myc. i. p. 428; Stev., Brit. Fung., p. 254.

On dead wood. Hymenial rugae or wrinkles intricately arranged, ridges papillose.

**Phlebia lirellosa.** B. & Br.

Resupinate, margin free, greyish-umber, 1-2 in. across, wrinkles thin, straight, branched, or in some instances anastomosing to form pores.

*Phlebia lirellosa*, B. & Br., Ann. Nat. Hist., n. 1973; Stev., Brit. Fung., p. 254.

*Daedalea lirellosa*, Persoon, Myc. Eur., iii. p. 2, t. 18, f. 2.

On branches, wood, &c.

**GRANDINIA.** Fr. (figs. 12, 13, p. 149.)

Crustaceous, effused, thin; hymenium covering the entire free surface, warted or granulose; warts entire, smooth, crowded, apices usually indented, basidia tetrasporous.

*Grandinia*, Fr., Epicr., p. 527; Stev., Fung. Brit., p. 255.

Distinguished by the minutely granular or warted hymenium, the warts are rounded, not pointed as in the resupinate species of *Hydnum*, often slightly excavated or porous at the apex, as in *Porothelium*.

Hymenium amphigenous, contiguous, waxy, papillose, warty, or granulose; the granules globular or hemispherical, entire, obtuse, crowded, regular, glabrous, persistent, incrusting, spreading, soft fungi. (Fries.)

***Grandinia granulosa*. Fr. (figs. 12, 13, p. 149.)**

Waxy, buff or whitish, broadly effused, closely adnate, margin determinate, smooth; hymenium crowded with equal minute granules; spores spherical,  $2.5-3\ \mu$  diameter, hyaline.

*Grandinia granulosa*, Fr., Epicr., p. 527; Stev., F. B., p. 255.

On dead wood, branches, &c. Forming a thin, closely adnate stratum, often effused for several inches.

Forming a thin, adnate, whitish, or sub-ochraceous stratum, following the irregularities of the wood, with scarcely any definite circumference, beset with crowded, rather sharp granules. (Berk.)

***Grandinia papillosa*. Fr.**

White, membranaceous, separating from the matrix, yellowish below; hymenium much cracked, granules minute, crowded, subequal, almost spherical.

*Grandinia papillosa*, Fr., Epicr., p. 528; Stev., F. B., p. 256.

On sticks, bark, &c. Effused for 1-2 in., very thin, and when in good condition separable as a very thin sheet.

***Grandinia ocellata*. Fr.**

Waxy, closely adnate, livid with a dull purple tinge, margin indeterminate, barren; hymenium with minute, unequal obtusely conical warts that become minutely collapsed at the apex.

*Grandinia ocellata*, Fr., Epicr., p. 527; Stev., B. Fung., p. 255.

On dead trunks. Not cracking when dry. Often effused for several inches.

***Grandinia crustosa*. Fr.**

White, or with a yellow tinge, irregularly effused, closely

adnate, thin, crustaceous, rather mealy; warts crowded, subglobose, minute, often collapsing at the apex, unequal.

*Grandinia crustosa*, Fries, Hym. Eur., p. 627; Stev., Brit. Fung., p. 256.

On bark of willow, pine, &c., and on *Polyporus versicolor*. Often forming a crust that extends for several inches.

**Grandinia mucida.** Fr.

Waxy and somewhat gelatinous, effused, subinnate, pale dull yellow; hymenium crowded with rather large, unequal, hemispherical, soft granules.

*Grandinia mucida*, Fr., Elench., p. 217; Stev., Fung., p. 255.

On rotting wood. Effused for several inches. Subgelatinous when moist, corrugated when dry.

**POROTHELIUM.** Fries (emended). (figs. 14, 15, p. 149.)

Thin and entirely resupinate, the surface covered with small warts that eventually become more or less perforated at the apex, basidia tetrasporous, borne on the outer surface of the warts as in *Hydnum*.

*Porothelium*, Fries, Obs. ii. p. 272; Stev., Brit. Fung., p. 231.

The present genus was placed by Fries in the *Polyporeae*, and considered as showing some affinity with *Fistulina* in the structure of the pores, which are at first solid, then excavated, but in reality the basidia do not line the pores, as in the *Polyporeae*, but the hymenium covers the outer surface of the warts or projections as in the *Hydneae*, and the species are very close to certain of the resupinate *Hydnums* that have the tips of the spines more or less excavated.

**Porothelium Keithii.** B. & Br.

Closely adnate, inseparable, thin, at first subgelatinous, forming patches 1-2 in. across, pale umber, margin very thin, subpulverulent; warts scattered, short, at length collapsing, gelatinous in the centre; spores linear-oblong,  $5 \times 2 \mu$ .

*Porothelium Keithii*, B. & Br., Ann. Nat. Hist., n. 1684; Stev., Brit. Fung., p. 231.

On dead fir. Distinguished amongst British species by



the dingy pale umber colour and subgelatinous consistency when growing.

**Porothelium Friesii.** Mont.

Forming broadly effused, thin, inseparable white or pale ochraceous patches of irregular form 1-3 in. across, flocculoso-membranaceous; margin thin, sterile, minutely fibrilloso-radiate; warts immersed, perforated at the apex, yellowish, scattered, at length becoming open; spores colourless, elliptical,  $5 \times 3 \mu$ .

*Porothelium Friesii*, Montagne, Ann. Sci. Nat. (1836), vol. v. p. 339; Cke., Hdbk., n. 840, fig. 69.

On bark and wood. Resembling a thin *Corticium*, and care must be taken not to confound the present species with thin forms of *Corticium lacunosum* and *C. porosum*, both of which are distinguished by the waxy, polished hymenium.

**Porothelium confusum.** B. & Br. (figs. 14, 15, p. 149.)

Broadly and irregularly effused, closely adnate and inseparable, thin, pallid, waxy-looking and rather polished, margin byssoid; papillae scattered, distinct, very short, excavated at the tip; spores  $4-5 \times 1.5 \mu$ .

*Porothelium confusum*, B. & Br., Ann. Nat. Hist., ser. v., vol. i. p. 24, no. 1685; Stev., Fung., p. 231.

On wood, sticks, &c. Often vaguely and irregularly effused, thin, dirty white, dingy pale buff when dry; papillae or pores not more than  $\frac{1}{4}$  line long.

**Porothelium Stevensoni.** B. & Br.

Substance rather thick, gelatinous, effused, closely adnate, whitish, margin rather coarsely hispid, at length almost smooth; papillae distinct, scattered, bearing at the apex a diaphanous yellow globule, interstices waxy, polished; spores  $4 \times 1.5 \mu$ .

*Porothelium Stevensoni*, B. & Br., Ann. Nat. Hist., n. 1683; Stev., Brit. Fung., p. 231, fig. lxxi.

On old pine-rail. Almost white when fresh, becoming yellowish when old. The limpid globule is at first pale. When full grown the papilla is from four to five times as long as the diameter of the globule. The mycelium imparts a sweet scent to the wood. Found in greatest perfection

on the under side of very old pine-rail lying on the ground. (B. & Br.).

Warts not more than  $\frac{1}{4}$  line high, the limpid globule consists of resin derived from the matrix.

ODONTIA. Pers. (figs. 18, 19, p. 149.)

Resupinate, effused, consisting of interwoven hyphae, dry, not waxy; surface warted, rarely spinulose, warts or spines cristate at the apex.

*Odontia*, Pers., Obs. ii. p. 16; Stev., B. Fung., p. 256.

Thin, resupinate fungi, known by the crested or penicillate apices of the warts or spines.

Hymenium formed of fibres interwoven into papillose warts, rarely awl or bristle-like, furnished at the apex with a multifid crest.

Resupinate, spreading fungi, dry, not waxy, approaching more to *Hydnum*. (Fries.)

*Odontia fimbriata*. Pers. (figs. 18, 19, p. 149.)

Cinnamon or pale buff, often tinged lilac, thin, broadly effused, traversed by prominent branching veins, margin fringed; warts small, tips crested.

*Odontia fimbriata*, Pers., Obs. i. p. 88; Stev., B. Fung., p. 257.

On dead wood. Often very broadly effused, entirely resupinate, usually a beautiful fawn-colour, appearing to the naked eye as being densely covered with small granules, which, when magnified, are seen to be fringed at the tips.

In young perfect specimens the membrane is furnished with branched ribs, which adhere less firmly to the matrix. Margin most elegantly radiato-fibrillose, white. Dry specimens are of a uniform fawn-colour, sometimes the fimbriated margin is entirely absent. Warts at first granular, minute, at length elongated. (Berk.)

*Odontia barba-jovis*. Fr.

White, then pale yellowish-tan, membranaceous, effused; warts conical,  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, with an orange fringe at the apex; spores subglobose, 5–6  $\mu$  diam.

*Odontia barba-jovis*, Fr., Hym. Eur., p. 627; Stev., B. F., p. 257.

On decaying wood. Spreading 12 in. and more. Distinguished from *Radulum quercinum* by the fimbriated orange tips of the spines.

On the under side of wood lying on the ground. Sometimes a foot or more broad; white when young, then yellowish rufous; membranaceous, composed of the finest down, margin byssoid, pure white. Spines simple, about 2 lines long, their tips somewhat penicillate. (Fries.)

**KNIEFFIA.** Fr. (figs. 16, 17, p. 149.)

Hymenium covering the whole exposed surface, destitute of granules and warts, but bearing scattered or fasciculate bristles. Basidium bearing a single sterigma. Broadly effused, thin, and encrusting, or in the most perfect form growing out of cracks in the bark, and assuming various shapes.

*Knieffia*, Fr., Epicr., p. 529; Stev., Fung., p. 257.

The minute bristles do not bear the hymenium, as is the case with the spines in *Hydnum*, but are barren outgrowths from the flat hymenial surface, and in this respect only differing from *Corticium*. In *Peniophora* the minute spines covering the hymenium differ in consisting of single large cells—cystidia.

***Knieffia setigera*.** Fr. (figs. 16, 17, p. 149.)

White, pale buff when dry, broadly effused, sometimes rather thick and fleshy, at others a mere film, bristles very minute, hyaline, scattered.

*Knieffia setigera*, Fr., Epicr., p. 529; Stev., Fung., p. 256.

Form very variable. Fries says that large specimens reach the size of an apple, but commonly thin and effused. British specimens, so far as I am aware, are always effused and entirely resupinate, forming a thin white layer that follows the irregularities of the matrix; superficially resembling *Grandinia granulosa*, but distinguished under a pocket-lens by the minute, bristle-like spines.

***Knieffia subgelatinosa*.** B. & Br.

Thin, subgelatinous, yellowish, then pale buff; spines very minute, scattered; spores broadly elliptical, apiculate,  $4 \times 2.5 \mu$ .

*Knieffia subgelatinosa*, B. & Br., Ann. Nat. Hist., n. 1444; Stev., B. F., p. 258.

On fir stumps. Forming a very thin, broadly effused subgelatinous film.

MUCRONELLA. Fr. (fig. 8, p. 149.)

Sporophore obsolete; spines subulate, simple, acute, glabrous, scattered or fasciculate, and then more or less connate at the base; basidia monosporous.

*Mucronella*, Fries, Hym. Eur., p. 629; Sacc., Syll. vii. p. 512.

*Mucronia*, Fries, S. V. S., p. 329 (not *Mucronea* of Ben-  
tham).

A peculiar genus, resembling *Hydnum* in the aculeate spines, but differing in the absence of the sporophore or resupinate portion from which the spines originate in *Hydnum*. Also differing in the monosporous basidia, which, in *Mucronella calva*, the only species I have examined, are but slightly or not at all inflated upwards, and suggest the conidiophores of some Hyphomycetous fungus, as *Isaria*. It may possibly be shown at some time, that the species of *Mucronella* are conidial conditions of some higher form, as *Ptychogaster* has been already proved to be the conidial condition of *Polyporus*.

*Mucronella calva*. Fr. (fig. 8, p. 149.)

Spines  $\frac{1}{2}$ –1 in. long, very slender, whitish, then grey, scattered, quite smooth and even, and covered externally, except at the tips, with slender, subequal, monosporous basidia; spores subglobose, apiculate, colourless, 4–5  $\mu$  diameter.

*Mucronella calva*, Fries, Hym. Eur., p. 629; Sacc., Syll. vi. n. 7038.

*Hydnum calvum*, Albertini and Schweinitz, p. 271, t. 10, f. 8.

On rotten pine and other wood. The spines are erect, not  $\frac{1}{2}$  mm. thick at the base, tapering to the apex, either scattered or gregarious. Very much resembling the upright, spine-like bodies not uncommon on trunks, and obviously belonging to young mycelium. The present species differs from such in bearing globose spore-like bodies.

## FAM. V.

## POLYPOREAE.

In the preceding family, the Hydneae, the hymenophore in typical genera was seen to be furnished with distinct outgrowths, either under the form of acute, tapering spines, blunt papillae, or finger-like projections, which in every instance produced the hymenium on their outer surface. In the present family the hymenophore consists of hollow tubes bearing the hymenium on their inner surface, the outer surface being sterile. In the genus *Phlebia*, belonging to the Hydneae, the markings of the hymenophore are reduced to slightly developed radiating or contorted wrinkles or veins, which in some species are minutely and irregularly toothed, hence the characteristic teeth are altogether wanting. In like manner the genus *Merulius*, belonging to the *Polyporeae* has the porous hymenium, characteristic of the family, reduced to very shallow and usually irregular depressions, formed by slightly elevated ridges or wrinkles on the surface. In both the above genera the entire substance is more or less gelatinous, and the two genera must be considered as forming a connecting link between the two families. In *Daedalea* the tubes are often more or less elongated, and the partition-walls or dissepiments gill-like, thus connecting the *Polyporeae* with the *Agaricineae* through the genus *Lenzites*, belonging to the last-named family. In several species of *Fomes* the hymenium is furnished with numerous large, coloured, fusiform or conical, rigid cystidia, as in the genus *Hymenochaete*. All such species are included by Ellis, the American mycologist, in a new genus called *Mucronoporus*.

## POLYPOREAE.

Sporophore pileate, with a central or lateral stem, horizontal and attached by a broad base, or entirely resupinate.

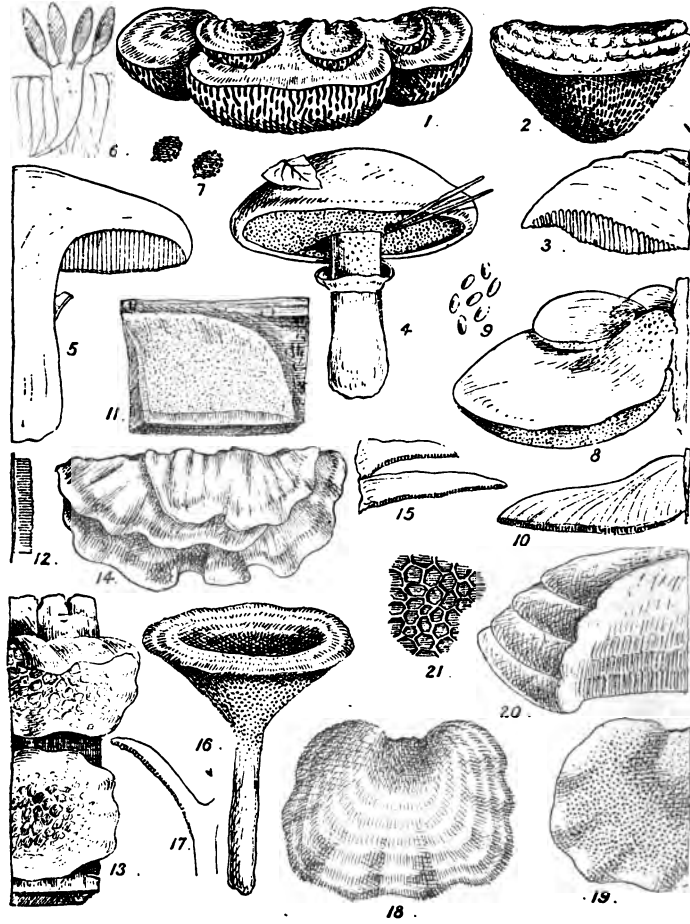
Hymenophore inferior and pointing to the ground in the higher forms, turned towards the light in resupinate forms, normally porous; pores rounded, angular or elongated and sinuous, bearing on their inner surface the usually tetrasporous basidia, accompanied in some species by cystidia. Spores continuous, colourless or coloured.

*Polyporei*, Fries, Hym. Eur., p. 495.

### ANALYSIS OF THE GENERA.

#### POLYPOREAE.

- Merulius.**—Subgelatinous. Tubes very shallow, formed by anastomosing wrinkles; resupinate.
- Daedalea.**—Tubes as in *Trametes*, but sinuous and labyrinthiform; corky; not stratose; sessile.
- Trametes.**—Tubes immersed in flesh of pileus, of various depths, hence not forming a heterogeneous stratum, subcylindrical, not stratose; corky; sessile.
- Poria.**—Tubes as in *Polyporus*, not stratose; entirely resupinate.
- Polystictus.**—Tubes as in *Polyporus*, not stratose, generally developing from the centre to the margin, at first shallow and punctiform, coriaceous or membranaceous.
- Fomes.**—Tubes as in *Polyporus*, often stratose; woody; sessile, dimidiate.
- Polyporus.**—Stratum of tubes distinct from hymenophore, but not separable, not stratose; fleshy and tough, stipitate or sessile.
- Fistulina.**—Fleshy, lateral, tubes crowded but distinct.
- Strobilomyces.**—Tubes like *Boletus*, but pileus with large scales; stem central.
- Boletus.**—Stratum of tubes easily separable from hymenophore; stem central.



## MERULIUS. Hall. (fig. 13, p. 184.)

Hymenophore resting on a loose mucedinous mycelium, covered with the soft, continuous hymenium, having its surface variously plicate or rugose, the folds forming irregular pores, and sometimes obsoletely toothed; spores colourless or coloured.

*Merulius*, Hall, *Helv.* (emend.), p. 150; *Stev.*, *Fung.*, p. 227.

Mostly growing on wood, at first soft and mucedinous, when the hymenium is formed often subgelatinous. Resupinate or effuso-reflexed. Distinguished from *Phlebia* by the irregularly porous hymenium, and from *Poria* by the very shallow irregular pores and the soft consistency.

## FIGURES ILLUSTRATING THE POLYPOREAE.

Fig. 1, *Daedalea quercina*, entire fungus; much reduced;—Fig. 2, *Trametes gibbosa*, entire fungus; much reduced;—Fig. 3, section of same; much reduced;—Fig. 4, *Boletus luteus*, entire fungus; much reduced;—Fig. 5, section of same; much reduced;—Fig. 6, Basidium with four spores of same; highly mag.;—Fig. 7, *Strobilomyces strobilaceus*, spores of: highly mag.;—Fig. 8, *Fistulina hepatica*, group of plants; much reduced;—Fig. 9, spores of same; highly mag.;—Fig. 10, section of same; much reduced;—Fig. 11, *Poria medulla-panis*, portion of a specimen; nat. size;—Fig. 12, section of same, showing the exceedingly thin stratum of flesh; nat. size;—Fig. 13, *Merulius corium*, two parts of plants, one effused, with the upper margin free and reflexed; the other resupinate, with the margin free; nat. size;—Fig. 14, *Polyporus fumosus*, illustrating the dimidiate or imbricated, horizontal, laterally attached form; nat. size;—Fig. 15, section of same, showing the very short tubes; nat. size;—Fig. 16, *Polyporus perennis*, illustrating the mesopod or central stemmed type, the pileus is infundibuliform or funnel-shaped; nat. size;—Fig. 17, section of same; nat. size;—Fig. 18, *Polystictus versicolor*, showing the velvety, zoned, upper surface of the pileus; small specimen, nat. size;—Fig. 19, portion of under or hymenial surface of same, showing the openings of the minute pores; nat. size;—Fig. 20, *Fomes ignarius*, portion of a plant, showing the thick, hoof-shaped, concentrically sulcate pileus; the section shows the stratified tubes, each stratum corresponding to one year's growth; reduced;—Fig. 21, *Poria Gordonensis*, showing the variable, irregularly angular openings of the tubes; enlarged.



*I. Spores coloured.***Merulius lacrymans. Fr.**

Broadly effused, usually entirely resupinate, but sometimes effuso-reflexed, thick, soft and rather moist, silky or minutely velvety below, yellowish-brown or dark brown in the centre, shading off to the tumid, sterile, silky, white or yellow sterile margin; folds large, gyrose, sometimes irregularly toothed; spores rusty yellow, obliquely elliptical,  $10-12 \times 5-6 \mu$ .

*Merulius lacrymans*, Fries, Syst. Myc. i. p. 328; Stev., Fung., p. 230.

On trunks, worked wood, carpet, &c. Patches varying from 2-3 in. to a foot and more in diameter,  $\frac{1}{2}$  in. or more thick at times. Very variable, but distinguished by the slightly gelatinous substance, irregularly rugulose hymenium, and bright rusty orange spores. Exuding drops of water when growing.

Whole plant generally resupinate, soft, tender, at first very light, cottony and white. When the veins appear they are of a fine yellow-orange or reddish-brown, forming irregular folds, most frequently so arranged as to have the appearance of pores, but never anything like tubes, and distilling, when perfect, drops of water. Sometimes the pileus or substance of the plant, from its situation, produces pendent processes like inverted cones. (Grev.)

*II. Spores white.*

\* *Crustaceo-adnate, margin more or less tomentose.*

**Merulius Carmichaelanus. Berk.**

White, forming a very thin, adnate pellicle irregularly effused for 1-2 in., folds very slightly prominent, very thin, forming a fairly equal, angular network; whole plant becoming brown when dry.

*Merulius Carmichaelanus*, Berk., Outl., p. 256; Stev., Fung., p. 230.

On bark. Pores often hexagonal, very shallow, by which character it is distinguished from the white species of *Poria*.

Entire plant resupinate, smooth, so thin as to be almost like a membrane, of no regular form, effused, of a pure white colour, changing when dry to a pinkish-brown, the margin membranaceous, and between byssoid and lacinate. My specimen is 2-3 inches in breadth. Pores occupying almost the whole substance of the plant, very shallow, minute, more resembling somewhat hexagonal little pits or cavities than pores, the dissepiments very thin. Spores very minute, globose. (Grev.)

The present minute but very curious species forms a mere pellicle, in its dry state of an uniform dull-brown, scarcely distinguishable from the bark on which it grows; but when examined with a moderate magnifying power, the regular often hexagonal reticulations exhibit a very elegant appearance, like the cells of a honeycomb, but quite superficial. (Berk.)

***Merulius pallens*. Berk.**

Pale-reddish, adnate, fleshy, somewhat gelatinous, thin, inseparable, margin indeterminate; folds poriform, pores minute; spores globose,  $4\ \mu$  diameter.

*Merulius pallens*, Berk., Outl., p. 296; Stev., Fung., p. 229.

On fir and oak.

***Merulius serpens*. Tode.**

Crustaceo-adnate, thin, almost glabrous, pallid then reddish, margin byssoid, white; hymenium with the folds at first free, then anastomosing and forming variously formed pores; spores cylindrical,  $4 \times 2\ \mu$ .

*Merulius serpens*, Tode, Abh. Hall. i. p. 355; Stev., Fung., p. 229.

On rotten pine. Extending in a wavy manner for 2 in. or more. Closely adnate, inseparable.

***Merulius rufus*. Pers.**

Crustaceo-adnate, often effused for 1-3 in., substance soft, smooth, reddish flesh-colour, sometimes with a purple tinge, margin almost smooth; hymenium distinctly and equally porous; spores subglobose,  $5\ \mu$  diameter.

*Merulius rufus*, Pers., Syn., p. 498; Stev., Fung., p. 229.

On dead wood. General appearance and hymenium of

*Polyporus* (= *Poria*), but distinguished by the soft nature of the hymenophore.

***Merulius porinoides*. Fr.**

Thin, crustaceo-adnate, margin byssoid, white, hymenium dingy yellow, folds poriform.

*Merulius porinoides*, Fries, Syst. Myc. i. p. 329; Stev., Brit. Fung., p. 229.

On dead wood, chips, bark, &c., and on the ground. Often forming patches 1-3 in. across.

**\*\* *Resupinato-effused, separable, thin, under-surface and margin byssoid or fibrillose.***

***Merulius laeticolor*. B. & Br.**

Resupinate, adnate, bright orange; margin tomentose, white; hymenium even, then plicato-rugose, folds distant; spores subglobose, 6-7  $\mu$  diam.

*Merulius laeticolor*, B. & Br., Ann. Nat. Hist., n. 1681; Stev., Fung., p. 228.

On sawdust and leaves. Resembling *M. aureus*, a species not yet found in Britain, but known by its brighter orange colour and white byssoid margin.

***Merulius molluscus*. Fr.**

Effused, thin, soft, membranaceous, margin byssoid, white; folds of hymenium poroso-gyrose, flesh-colour, spores elliptical, 4  $\times$  3  $\mu$ .

*Merulius molluscus*, Fries, Syst. Myc. i. p. 329; Stev., Fung., p. 229.

On wood and branches. Sometimes shortly reflexed, with the hymenium gyroso-dentate from the first, and not reticulated. Hymenium often brown with age. Effused for 1-3 in.

***Merulius himantioides*. Fr.**

Effused, very soft, silky, lilac, margin byssoid; hymenium dingy yellow or with an olive tinge, folds irregular, forming vague pores; spores yellowish, broadly elliptical, 7-8  $\times$  6  $\mu$ .

*Merulius himantioides*, Fries, Syst. Myc. i. p. 329; Stev., Fung., p. 228.

On pine wood, club-mosses, &c. Somewhat resembling *M. lacrymans*, but thinner and not pulverulent.

\*\*\* *Margin determinate, effuso-reflexed.*

***Merulius tremellosus.*** Schrad.

Resupinate; margin becoming free and more or less reflexed, usually radiato-dentate, gelatinoso-cartilaginous; hymenium variously rugose and porous; whitish and sub-translucent looking, becoming tinged brown in the centre; spores cylindrical, curved, about  $4 \times 1 \mu$ .

*Merulius tremellosus*, Schrad., Spic., p. 139; Stev., Fung., p. 227.

On wood. From 1-3 in. across, remaining pale when growing in dark places. Margin sometimes tinged rose, radiating when well developed.

***Merulius corium.*** Fr. (fig. 13, p. 184.)

Resupinato-effused for 3-4 in. or often more, upper margin usually free and reflexed; pileus whitish, silky or tomentose, substance thin, pliant; hymenium reticulato-porous, from pale ochraceous to clear tan; spores oblong,  $8-10 \times 3-4 \mu$ .

*Merulius corium*, Fries, Elench., p. 58; Stev., Fung., p. 228.

On trunks and branches. Very variable, but known by the white, silky pileus and the reticulato-porous ochraceous hymenium. The hymenium is sometimes tinged with lilac or rose-colour.

Pileus 2-3 in. long, or more, and often nearly as broad, resupinate, byssoid at the margin when young, but afterwards entire, and more or less free at the circumference. Colour pale buff, in age somewhat reddish in the centre. Substance very leathery, flexible, tough, varying in thickness, but mostly rather thin. Hymenium minutely and distinctly reticulated, the spaces between the reticulations concave, irregular. (Grev.)

Plant 2-3 in. broad; sometimes completely effused, with a white byssoid margin, or even the whole pileus is regularly reflexed; often imbricated; white, pubescent and zoned above, below pale buff or lilac, variously sinuato-rugose or reticulato-porous; very various in thickness, being sometimes a mere pellicle, while, on the contrary, individuals occur as thick as *Stereum hirsutum*. I have seen it covering the stump of a felled tree in the greatest profusion, imbricated

and completely reflexed, with the hymenium beautifully tinged with lilac. (Berk.)

***Merulius aurantiacus*. Klotzsch.**

Effuso-reflexed 1-1½ in. across, subcoriaceous, tough, dingy white, yellowish, or grey, coarsely tomentose, indistinctly zoned; hymenium minutely rugulose, somewhat porose, orange.

*Merulius aurantiacus*, Klotzsch, in Berk., Engl. Fl. v. p. 128; Stev., Fung., p. 228.

On decaying trunks.

Pileus 1 in. broad; zones obsolete, hirsuto-tomentose. Nearly allied to *Merulius corium*. (Berk.)

**DAEDALEA. Pers. (fig. 1, p. 184.)**

Firm, corky or woody; pores becoming elongated and irregularly sinuous, dissepiments corky and often flexible.

*Daedalea*, Pers., Syn., p. 449; Stev., Fung. Brit., p. 224.

Distinguished from *Trametes* and *Polyporus* by the very much contorted and sinuous pores; flesh at first soft and moist, trama present, but not distinct in colour or texture from flesh of pileus.

Hymenophore descending unchanged into the trama, which is firmer than in *Trametes*. Pores, when fully formed, labyrinthiform, lacerated, and toothed. In habit the species resemble *Trametes*, but they are inodorous, and must not be confounded with the species of *Polyporus* that have elongated, curved pores. (W. G. Smith.)

\* *Dimidiate, sessile on a broad or narrow base.*

***Daedalea quercina*. Pers. (fig. 1, p. 184.)**

Every part pale wood-colour; pileus corky, rugulose, uneven; pores at first rounded, becoming very much contorted and elongated, broad, dissepiments very thick, flexible.

*Daedalea quercina*, Pers., Syn., p. 500; Stev., Brit. Fung., p. 224.

On dead oak stumps, and trunks. Reaching to 6 in. or more across; pores  $\frac{1}{4}$ –1 in. deep, dissepiments flexible.

Pileus dimidiate, sessile, of a pale buff colour, and firm and corky substance. The surface is marked with concentric lines, which are sometimes changed into concentric ridges, more or less rough, with little knobs and inequalities, but always glabrous, and having a woody appearance to the eye. Hymenium composed of large, deep, sinuous, irregularly anastomosing lamellae, of a paler colour than the pileus, entire and rounded at the edges. The form of the pileus is very inconstant. In general it is more or less semicircular, nearly horizontal, subentire, and the hymenium forming either a boldly convex or nearly straight line from the margin to the base, where the lamellae are often two inches in length. Sometimes numerous smaller pilei are attached inseparably together in various directions, and press one another out of shape. In like manner the hymenium also varies, and sometimes permits the lamellae to fall down like the folds of a curtain. The flesh is of a pale reddish-brown, darker than the lamellae; and though of considerable substance in some specimens, in others is scarcely thicker than one eighth of an inch. (Grev.)

Perennial. Pileus 5–6 in. broad, sessile, dimidiate, of a pale woody appearance, smooth, marked with concentric raised or depressed zones and little radiating wrinkles, the margin in well-grown specimens is thin, but in ill-developed individuals swollen and blunt, in which state it is *D. gibbosa*, Pert. Gills of the same colour as the pileus, with sometimes a slight shade of pink, woody, thick, sinuous, branched and anastomosing, so as to form long wavy pores a line or more broad. Sometimes the whole plant is resupinate or decurrent, in which case the partitions are often elongated into tooth-like processes. (Berk.)

**Daedalea aurea. Fr.**

Pileus 1–2 in. across, rather thin, coarsely velvety, golden or tawny, more or less zoned; pores narrow, very sinuate, with the flesh pale yellow.

*Daedalea aurea*, Fries, Syst. M. i. p. 339; Stev., Brit. Fung., p. 224.

On oak, &c. Pileus more or less triangular.

**Daedalea confragosa.** Pers.

Pileus corky, 2-5 in. across, reddish-brown, indistinctly zoned, scabrid, flesh wood-colour, thick at base; pores rounded, becoming narrowly sinuous and torn, grey, then brownish.

*Daedalea confragosa*, Pers., Syn., p. 501; Stev., Brit. Fung., p. 225.

On willow, &c.

**Daedalea cinerea.** Fr.

Pileus 1-4 inches broad, corky, thick behind, becoming thin towards the margin, silky, zoned, greyish, margin paler; pores minute, elongated, very sinuous, white or greyish.

*Daedalea cinerea*, Fr., Syst. Myc. i. p. 336; Stev., Fung., p. 225.

On dead trunks, perennial, flesh thick  $\frac{1}{2}$ -1 in. at base, stratose, pale buff.

**Daedalea unicolor.** Fr.

Usually imbricated or broadly effused, rather thin; pileus grey, zoned, velvety; hymenium grey, pores long, sinuous, dissepiments often broken up into teeth.

*Daedalea unicolor*, Fries, Syst. Myc. i. p. 336; Stev., Fung., p. 225.

On stumps, trunks, rails, &c. Reaching 4-6 in. across. Often imbricated for a foot or more.

Imbricated. Pileus 2-4 in. broad, zoned, densely villous, often green from minute algae, pores narrow, small, irregular, unequal, subflexuous. (Berk.)

**\*\* Resupinate.****Daedalea latissima.** Fr.

Very broadly effused, thick, pale wood-colour outside and inside, thick, corky, zoned or stratose within; pores narrow, some very long and much contorted, others roundish.

*Daedalea latissima*, Fries, Syst. Myc. i. p. 340; Stev., Brit. Fung., p. 225.

On dead wood. Often spreading for a foot or more in a continuous sheet.

**Daedalea vermicularis.** Pers.

Thin, closely adnate, broadly effused, pores short, waved, becoming small and rounded towards the margin, flesh-colour with a rufous tinge.

*Daedalea vermicularis*, Pers., Myc. Eur. 3, p. 2; Stev., Fung., p. 226.

On the ground, attached by fibres.

**Daedalea ferruginea.** Schum.

Pileus resupinate or effuso-reflexed, pale yellowish rust-colour; pores rusty-brown, narrowly sinuous, with a conspicuous broad, sterile margin.

*Daedalea ferruginea*, Schum., in Fr., Syst. Myc. i. p. 339; Stev., Brit. Fung., p. 226.

Subcircular,  $\frac{1}{2}$ - $1\frac{1}{2}$  in. across. On wood.

## TRAMETES. Fr. (figs. 2, 3, p. 184.)

Pores roundish or more or less elongated radially; dissepiments rather thick, often unequal in depth and not forming a heterogeneous stratum, hence the trama is continuous with the flesh of the sporophore.

*Trametes*, Fries, Epicr., p. 488; Stev., Brit. Fung., p. 221.

Forming a connecting link between the genera *Daedalea* on the one hand and *Polyporus* and *Polystictus* on the other. The former is separated by the long, sinuous pores, and more obvious gill-like form of the dissepiments, the two latter by having the pores of uniform length, the thinner dissepiments, and smaller size of the circular or angular, not elongated pores.

The species grow on wood, and so far as British species are concerned, are more or less semicircular in form and attached laterally by a broad base, or otherwise resupinate. The substance becomes hard, woody or corky. Several are sweet-scented.

Hymenophore descending unchanged into the trama of the pores, which is permanently similar to the substance of the pileus. Pores concrete with the pileus, at first very small, then open, obtuse, entire, equal, round or linear, not labyrinthiform or lacerated. Corky or woody fungi, arboreal, always dimidiate, at first generally fragrant, and never acid.



\* *Dimidiate.*† *Flesh brown or ferruginous.***Trametes pini.** Fr.

More or less semicircular in outline, horizontal, attached by a broad, thick base, pileus rusty-brown, then blackish, concentrically sulcate, rough, strigose at the margin, flesh tawny ferruginous, hard; pores irregular, roundish or elongated, deep and indistinctly stratified in old specimens, bright ferruginous, with yellow tinge, becoming dusky.

*Trametes pini*, Fries, Syst. Myc. i. p. 336; Stev., Brit. Fung., p. 221.

On living pine trunks. From 2-4 in. across, flesh thick behind, pores about  $\frac{1}{4}$  in. deep first year, but the species is perennial and eventually the annual strata collectively become 1 in. or more thick. Smell slight, pleasant. Pores average  $\frac{3}{4}$ -1 mm. in diameter.

†† *Flesh whitish.***Trametes gibbosa.** Fr. (figs. 2, 3, p. 184.)

Horizontal, sometimes imbricated, semicircular or rather narrowed behind at the point of attachment; pileus concentrically zoned, minutely velvety, white, greyish with age, margin thick, obtuse, flesh white, corky, thickest behind, pores about  $\frac{1}{4}$  in. deep, small, usually elongated radially.

*Trametes gibbosa*, Fries, Epicr., p. 492; Stev., Fung., p. 222.

On stumps, trunks, posts, &c. A fine large species often reaching 4-6 in. across, and 3-4 in. from back to front, about  $\frac{3}{4}$  in. thick at the back, sometimes altogether smaller. Known by the white, velvety concentrically zoned pileus and the narrow pores a little elongated in a radial direction. Sometimes the pores are quite irregular in form, average size 2 mm. long by  $\frac{1}{4}$  mm. wide.

Sessile, dimidiate, zoned, corky, hard, elastic, zones convex and tuberculated, dirty-white, beautifully velvety, when old cinereous and green from minute algae, the edge obtuse or subacute, often projecting at the base and very gibbous, but not invariably so; substance white; pores linear, mostly straight, except at the base, where they are roundish or irregular, very narrow, pale tan. (Berk.)

Gregarious but scarcely caespitosely imbricated; pileus corky, whitish, at length powdered with green, pulvinate, elastic, subtomentose, sometimes zoned, size variable (1-4 in. broad), base often porrecto-gibbous, margin obtuse, often obscure grey, pileus at length becoming greyish; flesh white, very tough, pores oblong, straight, some subrotund, white. (Fries.)

The green colour mentioned by Fries is due to the presence of minute algae which grow amongst the tomentum of the pileus.

***Trametes Bulliardi.* Fr.**

Pileus 2-4 in. across,  $\frac{3}{4}$ -1 in. thick at point of attachment, becoming thinner and subacute towards the margin, white, then brownish, becoming zoned; flesh whitish, then wood-colour; pores irregularly roundish, unequal,  $\frac{1}{4}$  in. deep, pallid, then rufescent; odour fragrant.

*Trametes Bulliardi*, Fries, *Epier.*, p. 421; *Stev.*, *Brit. Fung.*, p. 222.

On dead wood. The pores average about 1 mm. in diameter, some larger.

***Trametes suaveolens.* Fr.**

Horizontal, 3-6 in. across, often 1 in. or more thick at the point of attachment, becoming thinner towards the margin; pileus villose, whitish, zoneless, flesh thick, white, corky; pores  $\frac{1}{4}$  in. or more in length, irregularly rounded, rather large, white, becoming fuscous; spores cylindric-oblong  $6 \times 2.5 \mu$ ; odour spicy.

*Trametes suaveolens*, Fries, *Epier.*, p. 491; *Stev.*, *Fung.*, p. 222.

On trunks, especially willow. The pores average about 1 mm. in diameter.

Easily distinguished by its odour (when young) which resembles aniseed. White at first, then rufescent, zoned and scabrous, within dingy straw-colour. (Fries.)

The present species is not our only scented one, the other characters must be taken in combination.

***Trametes odora.* Fr.**

Horizontal, 2-4 in. across, 2 in. from front to back, up to

1 in. thick at point of attachment, becoming thin towards the margin; pileus whitish, smooth, even, zoneless, villous; flesh thick, soft, and corky, whitish; pores  $\frac{1}{4}$ – $\frac{1}{2}$  in. deep, round and fairly regular, small, pale ochraceous; odour fragrant, spicy.

*Trametes odora*, Fries, *Epier.*, p. 491; Stev., *Brit. Fung.*, p. 222.

On willow. Resembling *Trametes suaveolens*, from which it differs in the shorter, and much smaller, regular, round pores that average about two in the space of 1 mm., dissepiments thick.

***Trametes inodora*. Fr.**

Inodorous, 2–3 in. across,  $\frac{1}{2}$ – $\frac{3}{4}$  in. thick at base, tapering to a thin acute margin; pileus minutely velvety, white or tinged yellow and often obsoletely zoned, flesh white, corky; pores  $\frac{1}{4}$ – $\frac{1}{2}$  in. deep, persistently whitish, small, subangular or usually elongated.

*Trametes inodora*, Fries, *Hym. Eur.*, p. 584; Stev., *Brit. Fung.*, p. 223.

On stumps, &c. Distinguished amongst the white horizontal forms by being inodorous, and the persistent white colour of the pores, which average about  $\frac{1}{4}$ – $\frac{1}{2}$  mm. wide and 1–1 $\frac{1}{2}$  mm. in length; sometimes roundish. The pileus is sometimes tinged with pink at the base, and when dry often has faint yellow zones.

**\*\* Resupinate.**

***Trametes serpens*. Fr.**

White, resupinate, closely adnate, inseparable, margin determinate, pubescent, at first erumpent, orbicular, then confluent and forming elongated patches; pores very shallow, rounded or angular, unequal.

*Trametes serpens*, Fries, *Hym. Eur. i.* p. 586; Stev., *Fung.*, p. 223.

*Polyporus Stephensii*, B. & Br., *Ann. Nat. Hist.*, n. 356.

On bark. Thickness, including pores about  $\frac{1}{2}$  in. thick; pores very shallow, pit-like, about 1 mm. across. The entire fungus becomes pale ochraceous with age.

**Trametes mollis.** Fr.

Resupinate, often broadly effused, determinate, submembranaceous, separable, pale wood-colour then brownish, margin at length more or less reflexed, umber and pubescent below; pores large, unequal; dissepiments often torn.

*Trametes mollis*, Fries, Hym. Eur., p. 585; Stev., Fung., p. 223.

*Polyporus cervinus*, Pers., Myc. Eur. ii. p. 87; Berk., Outl., p. 247.

On wood and branches, especially beech. Well marked by the resupinate habit and large, irregular, shallow pores, measuring on an average,  $\frac{3}{4}$ –1 mm. when angular or roundish, often larger and elongated, but not sinuous as in *Daedalea*. Becoming blackish; often subcircular at first, then elongated for several inches.

**Trametes Terrei.** B. & Br.

Resupinate, pulvinate, about 3 in. across, 1 in. thick in the centre, thinning away on every side to the margin; substance white, corky, firm; pores angular, rather large, here and there sinuate, pallid.

*Trametes Terrei*, B. & Br., Ann. Nat. Hist. n. 1571; Stev., Brit. Fung., p. 223.

On beech. The type specimen, fortunately, is in a good state of preservation, and is likely to remain unique, as suggesting a "sport" more than the type of a new species. The pores average about  $\frac{1}{2}$ – $\frac{3}{4}$  mm., here and there elongated and more or less wavy or sinuous.

PORIA. Pers. (figs. 11, 12, 21, p. 184.)

Entirely resupinate, forming more or less extended patches or thin membranaceous expansions; pores forming a continuous stratum, springing from a thin woody or waxy layer which in some instances is exceedingly thin and rudimentary.

*Poria*, Persoon, Syn., p. 542 (as a subgenus); Sacc., Syll. vi. p. 292. *Polyporus (resupinatae)* of most authors.

Separated from the old genus *Polyporus* on account of the entirely resupinate habit. It is probable that many forms at present considered as species will prove to be resupinate

conditions of *Polystichus* and *Fomes*; however, until evidence is forthcoming, such must be considered as entities.

### ANALYSIS OF THE SPECIES OF PORIA.

I. Pores persistently white, or becoming pallid or pale ochraceous when dry, but never assuming bright tints.

II. Pores white, changing to brown, green, red, or some colour other than pallid or ochraceous when dry.

III. Pores white, with a more or less decided tinge of red or flesh-colour when growing.

✓ IV. Pores when growing, bright yellow, ochraceous, or honey-colour.

V. Pores, umber, rufous, brown, purple, flesh-colour, or cinnamon.

#### I. Pores persistently whitish.

##### *Poria vaporaria*. Fr.

Broadly effused, thin, inseparable, the white mycelium penetrating the matrix; pores large, angular, white then cream-colour, forming a continuous stratum.

*Polyporus vaporarius*, Fries, Syst. Myc. i. p. 382; Stev., Brit. Fung., p. 219.

On dead trunks, branches, &c. Often broadly effused, inseparable, pores very variable, large, angular, often irregularly torn and more or less oblique, appearing as if sunk into the matrix, usually bark, whitish or pallid, becoming pale ochraceous when dry. Pores often reaching 1 mm. in length.

*Var. secernibilis*, B. & Br., Ann. Nat. Hist., n. 1022; Stev., Brit. Fung., p. 219.

White, honey-colour when dry, separable from the matrix. On fir leaves under moss.

##### *Poria mollusca*. Fr.

Effused, thin, soft, white, margin fibrillose, radiating; pores short, minute, roundish, very thin and unequally torn, occupying the central portion of the patch or here and there in scattered clusters,  $\frac{1}{4}$ – $\frac{1}{2}$  mm. diameter.

*Polyporus molluscus*, Fries, Syst. Myc. i. p. 384; Stev., Brit. Fung., p. 218.

On rotten wood, also on dead leaves. Sometimes broadly effused, known by the fringed, fibrillose margin; the partitions of the pores are very thin and usually toothed or torn. Sometimes tinged with yellow.

At first forming a mere fringed byssoid membrane, which gradually acquires moderate, rigid, subrotund, and angular pores, the partitions of which are so thin that they very generally become lacerated. (Berk.)

***Poria vulgaris.* Fr.**

Broadly effused, white, flesh obsolete, consisting almost entirely of closely packed, minute, round, subequal tubes about  $\frac{1}{2}$ -1 line long; margin soon even and smooth.

*Poria vulgaris*, Fries, Syst. Myc. i., p. 381.

*Polyporus vulgaris*, Stev., Brit. Fung., p. 218.

On dead wood, branches, &c. Often effused for 8-12 in., inseparable except in fragments. Pores vertical or oblique, sometimes yellowish,  $\frac{1}{4}$ - $\frac{1}{2}$  mm. across.

***Poria medulla-panis.* Fr. (fig. 11-12, p. 184.)**

White, effused, circumference naked, determinate, more or less marginate; flesh obsolete, consisting almost entirely of rather long, entire, medium-sized pores.

*Polyporus medulla-panis*, Fries, Syst. Myc. i. p. 380; Stev., Fung., p. 216.

On rotten wood, branches, &c. Forming patches 2-4 in. across, about 2 lines thick. Becoming rigid and separable when dry. Sometimes tinged yellow when old. Said to grow on the ground.

Effused, white, becoming yellowish in age, roundish, tolerably defined, dry, thickish, following in some degree the inequalities of the wood. Pores elongated, roundish, straight or oblique, according to situation. Flesh almost none. (Grev.)

Pores about  $\frac{1}{4}$ - $\frac{1}{2}$  mm. across.

***Poria vitrea.* Pers.**

Broadly and unequally effused, separable, whitish, subhyaline, indeterminate, margin thin, villous; pores minute, entire, rather long, roundish, straight or oblique according to situation.

*Polyporus vitreus*, Pers., Obs. i. p. 15; Stev., Brit. Fung., p. 217.

On rotten wood, especially fir. Shining, 2 lines thick or more; recognised by the rather thick elastic flesh below the pores, which separates readily from the matrix. Pores about  $\frac{1}{2}$  mm. diameter.

Distinguished by its distinct xylostromatoid substratum, which separates easily from the matrix. (B. & Br.)

***Poria Hibernica*. B. & Br.**

Appearing as small, orbicular spots which soon become confluent and form broadly extended white patches, adnate, inseparable, white, margin narrow, very thin, radiatobysoid; pores very short, dissepiments thin, firm, acute, almost entire, openings small, polygonal; spores elliptical,  $5 \times 3 \mu$ .

*Polyporus (resupinatus) Hibernicus*, Berk. and Broome, Ann. Nat. Hist., n. 1291; Fries, Hym. Eur., p. 579.

On decorticated pine. Distinguished from *Poria Gordoniensis* by being inseparable, and from *P. radula* and *P. vaporaria* by the size of the spores, also by the smaller and more regularly angular openings of the pores, and by the thin, firm, usually entire and acute dissepiments. Pores  $\frac{1}{2}$ – $\frac{1}{3}$  mm. across.

***Poria Gordoniensis*. B. & Br. (fig. 21, p. 184.)**

Effused for 1–2 in., very thin and membranaceous but separable from the matrix, persistently white; margin shortly fimbriate; pores minute, unequal, angular, dissepiments very thin, minutely toothed at the margin.

*Polyporus Gordoniensis*, Berk. & Broome, Ann. Nat. Hist., n. 1023; Stev., Brit. Fung., p. 219.

On fir poles.

An extremely delicate species, but not in the slightest degree innate. The margin remains snow-white, and the pores themselves change colour only very slightly in drying. (B. & Br.)

Forming patches 1 in. across or more; pores 3 to 4 in the space of 1 mm. Superficially resembling *P. hibernica*, but distinguished by the torn margins of the dissepiments, and in being separable from the matrix.

**Poria blepharistoma.** B. & Br.

Entirely resupinate, very thin, snow-white, mycelium cobweb-like, somewhat pulverulent; pores small, dissepiments thin, edge finely toothed, spores elliptical, apiculate, colourless,  $5 \times 3 \mu$ .

*Polyporus blepharistoma*, B. & Br., Ann. Nat. Hist., n. 1434; Stev., Brit. Fung., p. 220.

On dead wood, branches, &c. Forming exceedingly thin, persistently snow-white patches 1-2 in. across. Pores exceedingly shallow, about  $\frac{1}{3}$  mm. across.

**Poria farinella.** Fr.

White, broadly and irregularly effused, thin, mycelium floccose or pulverulent, not interwoven; pores forming a continuous stratum, unequal, somewhat flexuous and intricate, dissepiments thin.

*Polyporus farinellus*, Fries, Syst. Myc. i. p. 384; Stev., Brit. Fung., p. 220.

On dead beech wood, &c. Very variable, almost disappearing on being touched, with the substance of *Corticium ambuci*. Pores about  $\frac{1}{3}$  mm. across.

**Poria reticulata.** Fr.

Orbicular, white, thin, soon disappearing, margin floccose, byssoid, radiating, pores distant, resembling cup-shaped depressions in the substance.

*Polyporus reticulatus*, Fries, Syst., Myc. i. p. 355; Stev., Brit. Fung., p. 220.

On rotten wood. The dissepiments of the rather large, shallow pores resembling a network, pores about  $\frac{1}{3}$  mm. across.

**Poria Vaillantii.** Fr.

White, thin, the cord-like spreading mycelium connected imperfectly by a membranaceous expansion; pores short, rather large, unequal, produced here and there in clusters, dissepiments thin.

*Polyporus Vaillantii*, Fries, Syst. Myc. i. p. 383; Stev., Brit. Fung., p. 219.

On dead wood. Perhaps an abnormal or imperfectly developed condition of some species. The principal feature is the spreading, cord-like, white mycelium connected by a



thin membranaceous film that here and there produces clusters of large, irregular pores averaging about  $\frac{1}{2}$  mm. across.

Forming a thin, white, or slightly rufescent, byssoid, broadly effused, close membrane, here and there traversed by rooting ribs. (Fries.)

***Poria callosa*. Fr.**

Broadly effused, white, equal, tough, separable like a sheet of leather, flesh thick, firm, but not rigid, 1-2 lines thick, everywhere covered with round, equal, quite entire pores that form a firm stratum, spores obliquely elliptical,  $6 \times 3.5 \mu$ .

*Polyporus callosus*, Fries, Syst. Myc. i. p. 381; Stev., Brit. Fung., p. 217.

On rotten wood. Readily known by the thick, leather-like flesh, and by separating readily from the substratum.

***Poria mucida*. Fr.**

White, then pallid, rather thick, soft, subimmersed, margin indeterminate, byssoid, pores medium-sized, unequal, torn, seated on the flesh formed by the mycelium.

*Polyporus mucidus*, Fries, Syst. Myc. i. p. 382; Stev., Brit. Fung., p. 217.

On rotten fir wood. Forming patches 5-6 in. or more long,  $\frac{1}{2}$  in. or more thick. Varies, softer or firmer according to the position, but is moderately persistent, generally moist, much thicker than *P. mollusca*. Tubes 1-3 mm. long, pores  $\frac{1}{4}$ - $\frac{1}{2}$  mm. across.

***Poria hybrida*. B. & Br.**

White, mycelium forming rather thick, felt-like patches or branched, creeping strands; pores long, minute, slender, in scattered patches, not forming a continuous hymenium; spores elliptic-oblong, colourless,  $4 \times 2 \mu$ .

*Polyporus hybridus*, Berk. & Broome, in Berk., Outl., p. xviii; Stev., Fung., p. 221.

On oak wood. Causing the dry-rot of oak ships. Supposed by Fries to be a morbid form of some species (perhaps *P. destructor*), its peculiarities caused by the abnormal condition under which it occurs. Pores about  $\frac{1}{2}$  mm. diameter, 2-4 mm. long.

**Poria collabefacta.** B. & Br.

Forming white, very smooth, Corticium-like patches; the formation of the pores appears to be due to the collapsing of the substance, short; margin obtuse; spores colourless, elliptic-oblong,  $4 \times 1.5 \mu$ .

*Polyporus collabefactus*, B. & Br., Ann. Nat. Hist., n. 1432; Stev., Fung., p. 218.

On dead wood. The barren parts resemble exactly a very smooth *Corticium* after the fashion of *C. calceum*; the pores seem first to arise from the mere collapsing of the substance, always shallow; margin obtuse. (B. & Br.)

Size of depressions or pores very variable,  $\frac{1}{3}$ – $\frac{3}{4}$  mm. across. Much more like an abnormal *Corticium* than a *Poria*.

**Poria radula.** Fr.

Effused, thin, white, formed entirely from the loose, dry mycelium, villous below; pores medium-sized, angular, dissepiments toothed, pubescent when young.

*Polyporus radula*, Fries, Hym. Eur., p. 578; Stev., Brit. Fung., p. 219.

On wood, dry branches, &c. With the habit of *P. sanguinolenta*, but much looser and drier in texture, also separable from the matrix and not turning red when bruised. Pores about  $\frac{1}{3}$  mm. across, sometimes oblique, usually bounded by a sterile margin.

**Poria obducens.** Pers.

White, effused, incrusting, innate, inseparable, pores, minute, short, flesh almost obsolete, distinctly stratose, stratified portion pale buff; spores elliptical  $4 \times 2 \mu$ .

*Polyporus obducens*, Persoon, Myc. Eur., ii. p. 104; Stev., Brit. Fung., p. 217.

On rotten wood. During the first year somewhat resembling *P. vulgaris*, afterwards becoming stratose, a single stratum of pores about 1 line thick being formed annually on the surface of the layer of the previous season. Sometimes small pileoli are formed, and in all probability the present is only a resupinate condition of *Fomes connatus*.

**Poria hymenocystis.** B. & Br.

Snow-white, mycelium below and at the margin cobweb-like; pores shallow, large, at length pallid, the very thin

scarious dissepiments at length collapsing; spores colourless, subglobose, minute,  $3 \times 2 \mu$ .

*Polyporus hymenocystis*, B. & Br., Ann. Nat. Hist., n. 1810 bis; Stev., Brit. Fung., p. 220.

On dead wood, Exceedingly thin, margin minutely byssoid, in some places almost indeterminate, pores about  $\frac{1}{4}$  mm, across, readily known by the large pores, collapsing dissepiments, and especially the minute, subglobose spores.

## II. White, changing to some other colour when dry.

### *Poria subfusco-flavida*. Rost.

Patches broadly effused and becoming confluent, thin, coriaceous, dry, closely adnate, changing from white to yellowish brown; margin thin, byssoid, white, determinate; pores minute, irregular.

On old dead oak wood, planks, &c. Extending for 8-12 in. The pores appear when viewed one way of a greyish-brown, and the other white. (B. & Br.)

### *Poria viridans*. Berk.

Effused, thin, crustaceo-adnate, at first white, becoming pallid green when dry, margin tomentose; pores minute, angular, dissepiments very thin; spores,  $4 \mu$   $2.5 \mu$ .

*Polyporus viridans*, Berk. & Br., n. 347; Stev., Brit. Fung., p. 216.

On rotten wood. Effused, forming patches a few inches long, perfectly white at first, but in drying assuming a delicate pale green, with a honey-like tinge in parts; border pulverulento-tomentose, very thin; pores minute, angular, dissepiments thin. This pretty species has the habit of *P. vulgaris*. (B. & Br.)

Pores about  $\frac{1}{4}$  mm. across.

### *Poria Renneyi*. B. & Br.

Subiculum rather thick, at first somewhat frothy, then dry, white, changing to citron-yellow when dry; pores white, scantily produced, elongated, dissepiments thin; spores numerous, colourless, elliptical, minute,  $3 \times 1.5 \mu$ .

*Polyporus Renneyi*, B. & Br., Ann. Nat. Hist., n. 1433; Stev., Brit. Fung., p. 215.

On stumps, and running on the ground. Pores 2–3 mm. long, openings rather irregular, averaging about  $\frac{1}{2}$  mm. across.

**Poria terrestris.** Fr.

Effused, very thin, composed of delicate byssoid hyphae, white, evanescent; pores central, very minute, white, then rufescent.

*Polyporus terrestris*, Fries, Syst. Myc. i. p. 383; Sacc., Syll. vi. n. 6150; Stev. Fung., p. 216.

On the ground or on rotten wood in close damp places. Very thin, almost disappearing when touched. Pores angular, very shallow, about  $\frac{1}{2}$  mm. across.

**Poria cincta.** Berk.

White, turning pallid, forming small, erect, scattered tufts, each tuft encircled by radiating strigose fibres; pores exceedingly minute, pallid ochraceous, darker when dry, angular dissepiments very thin, minutely toothed at the edge; spores subglobose, colourless, 4–5  $\mu$ .

*Polyporus cinctus*, Berk., Outl., p. 250; Stev., Brit. Fung., p. 215.

On old deal boards. Some of the patches are barren, and some at length become confluent. Under favourable circumstances a distinct hymenium,  $1\frac{1}{2}$  line thick, with a free, even, abrupt, vertical circumference, is formed in the centre of each tuft. Pores so minute as to be scarcely visible to the naked eye. The colour of the whole plant is pale ochraceous, more or less tawny when dry. (Berk.)

Tubes two lines long, pores  $\frac{1}{2}$ – $\frac{1}{4}$  mm. across. Whole fungus brown and rigid when dry.

**Poria subgelatinosa.** B. & Br.

Orbicular, margin raised, subgelatinous, whitish tomentose, becoming blackish; pores grey, small, edge of the dissepiments acute, entire; spores colourless, broadly elliptical,  $4 \times 2.5$ – $3 \mu$ .

*Polyporus subgelatinosus*, B. & Br., Ann. Nat. Hist., n. 1569; Stev., Brit. Fung., p. 216.

On dead wood, parasitic on *Polyporus amorphus*.

This singular species forms little pulvinate masses, with an obtuse raised border, which is at first tomentose and pallid, of a subgelatinous consistence, and turning black.

The pores are of a pale delicate grey, with an acute, even edge, about  $\frac{1}{16}$  of an inch in diameter. We cannot point out any species to which it is allied. (B. & Br.)

Pores about  $\frac{1}{2}$  mm. across, angular, very shallow.

***Poria sanguinolenta.* A. & S.**

Nodulose, soon confluent, effused, soft, white, but becoming blood-red when touched; the byssoid margin soon disappearing; pores roundish, small, unequal, becoming torn.

*Polyporus sanguinolentus*, Albertini and Schweinitz, Lusat., p. 257; Stev., Brit. Fung., p. 218.

On dead branches, rails, &c. First appearing as small, detached mycelioid tufts, which soon become confluent and form a continuous, often broadly effused, thin stratum; substance soft and becoming red at once when injured, in this respect resembling *Corticium sanguineum*. Pores very irregular in form, about  $\frac{1}{2}$  mm. across. The plant usually contracts much during drying, and is consequently torn into irregular patches.

**III. Pores white, tinged red or flesh-colour.**

***Poria rhodella.* Fr.**

Effused, soft, thin, closely attached to the matrix, white, with a pink or rosy tinge, margin determinate, naked; pores minute, short, subrotund, not at all torn.

*Polyporus rhodellus*, Fries, Syst. Myc. i. p. 380; Stev., Brit. Fung., p. 213.

On trunks of beech, fir, &c.

***Poria micans.* Fr.**

Effused, orbicular, usually becoming confluent, soft, white, with a flesh-tinge; margin white byssoid; pores very shallow, angular, resembling honeycomb, walls exceedingly thin, somewhat toothed under a lens.

*Polyporus micans*, Fries, Syst. Myc. i. p. 383; Stev., Fung., p. 213.

On dead wood, rotten trunks, &c. Distinguished from *P. rhodellus* by the angular pores and white byssoid margin. Pores very irregular in size and form, always angular,  $\frac{1}{2}$ – $\frac{3}{4}$  mm. diameter.

*IV. Pores yellow, ochraceous, or honey-colour.*

**Poria Laestadii.** Fr. & Berk.

Substance thin, white, very brittle, separable; hymenium tuberculose here and there; pores short, bright citron-yellow, circular or rather elongated and sinuous, very minute; spores  $5 \times 2.5 \mu$ .

*Polyporus Laestadii*, Fries & Berk., Ann. Nat. Hist., n. 2025.

On the underside of a deal board in a hot-house. Colour bright persistent yellow; forming confluent patches many inches in length; substance from 1-2 lines thick, compact, white, surface irregular, nodulose, the lumps varying in size from a pin's head to that of a pea and larger; pores exceedingly short, sometimes circular, 4-5 in the space of 1 mm. or elongated and curved. Judging from the specimens, the fungus appears to be perennial, a new stratum of pores developing each year, the latest stratum bright primrose-yellow.

**Poria nitida.** A. & S.

Effused, subadnate, determinate, margin villous, yellow or almost golden; pores short, minute, round, equal, shining.

*Polyporus nitidus*, Alb. & Schw., Lus., p. 258; Stev., Brit. Fung., p. 214.

On rotten wood. Recognised by its bright yellow colour. Crust-like, adnate.

**Poria bombycina.** Fr.

Effused, silky-membranaceous, loosely attached to the matrix, dirty yellow, margin velvety; pores large, angular and sinuous; spores elliptic-oblong,  $6-7 \times 4 \mu$ .

*Polyporus bombycinus*, Fries, Elench. i. p. 117; Stev., Brit. Fung., p. 214.

On rotten wood, &c. Pores at first appearing as roundish depressions in the loosely silky substance of the fungus, then becoming angular and sinuous, when regular about  $\frac{1}{3}$  mm. across.

**Poria ramentacea.** B. & Br.

Somewhat orbicular; subiculum white, tomentose, margin obsolete; pores honey-colour, large, somewhat hexagonal, dissepiments thin, rather rigid, entire; spores  $6 \times 3 \mu$ .

*Polyporus ramentaceus*, B. & Br., Ann. Nat. Hist., n. 1809; Stev., Brit. Fung., p. 214.

On dead branches. Pores  $\frac{1}{2}$ – $\frac{3}{4}$  mm. across. Fungus cartilaginous and horny when dry.

V. Pores *umber, rufous, brown, purple, flesh-colour or cinnamon.*

*Poria umbrina*. Fr.

Resupinate, effused, up to  $\frac{1}{2}$  in. thick; surface rather uneven, umber with a rufous tinge, pores minute, roundish, unequal; margin smooth, paler than the hymenium.

*Polyporus umbrinus*, Fries, Hym. Eur., p. 571; Stev., Brit. Fung., p. 211.

On trunks. Extending for 2–3 in., flesh almost obsolete; distinguished amongst its allies by the dingy umber colour and pale, smooth margin.

*Poria rufa*. Fr.

Effused, thin, closely adnate, coriaceous, determinate, blood-red with a rufous tinge; pores minute, thin.

*Polyporus rufus*, Fries, Epicr., p. 484; Stev., Brit. Fung., p. 213.

On branches and prostrate trunks. Margin byssoid when young.

*Poria aneirina*. Sommerf.

Effused, thin, subinnate, margin white, byssoid; pores large, waxy, angular, even, fulvous.

*Polyporus aneirinus*, Sommerfeldt, Lapp., p. 276; Stev., Brit. Fung., p. 214.

On dead wood and branches, of poplar more especially. Commencing as in *P. bombycina* as a byssoid membrane from which the pores are formed, which at length become waxy, generally exactly hexagonal, and tawny or fulvous,  $\frac{2}{3}$ –1 mm. across. Distinguished by its large pores, the hymenium of which has a peculiar smooth, waxy aspect. (B. & Br.)

Usually becoming much contracted and cracked or torn during drying.

*Poria incarnata*. Fr.

Broadly effused, corky-coriaceous, persistent, firm, upper margin frequently reflexed; hymenium flesh-colour, pores elongated, unequal, commonly oblique.

*Polyporus incarnatus*, Fries, Syst. Myc. i. p. 378; Stev., Brit. Fung., p. 213.

On rotten pine and fir trunks. Often effused for 3-6 in. in length, upper margin frequently shortly reflexed. Care must be taken not to confound the present species with *Polystictus abietinus*, which differs in the large, lacerated violet pores, that eventually become pale and more or less cinnamon colour.

Effused, irregular, thin, coriaceous, marginate, or im-marginate; margin white, cottony, rather thick, as if there was a tendency to become reflexed. Pores about  $\frac{1}{3}$  mm. diameter, minute, very short, round, sub-equal, straight or oblique, of a fine flesh-colour, approaching in some cases to orange. Sometimes small cottony protuberances occur amongst the pores, which have the appearance of small pilei with tubes underneath. (Grev.)

***Poria violacea*. Fr.**

Effused, determinate, thin, violet-colour, closely adnate, pores very shallow, cellular as if formed by upraised veins or ridges, entire; spores elliptical,  $7 \times 4 \mu$ , tinged yellow.

*Polyporus violaceus*, Fries, Obs. ii. p. 263; Stev., Brit. Fung., p. 212.

On fir stumps, trunks, poles, &c. Somewhat resembling *Merulius* in the shallow pores. Care must be taken not to confound the present species with *Polystictus abietinus*, which differs in the deeper torn pores, and is also usually more or less reflexed. Pores from  $\frac{1}{4}$ - $\frac{3}{4}$  mm. across.

Allied to *Merulius*, for which a young specimen might easily be taken. (Cke.)

***Poria purpurea*. Fr.**

Broadly and irregularly effused, the white flocculose mycelium creeping over the surface of rotten wood and producing here and there groups of minute, unequal, purple-lilac pores about 1 line long.

*Polyporus purpureus*, Fries, Syst. Myc. i. p. 379; Stev., Brit. Fung., p. 212.

On rotten trunks of beech and willow. Often broadly effused. The violet colour usually disappears during drying. Pores about  $\frac{1}{3}$  mm. across.



***Poria contigua.* Fr.**

Effused, about  $\frac{1}{2}$  in. thick, firm, when young cinnamon, dingy when old; pores rather large, equal, entire; margin at first villose.

*Polyporus contiguus*, Fries, Hym. Syst. Myc. i. p. 378; Stev., Brit. Fung., p. 212.

On rotten wood, fallen branches, &c. Not so broadly effused as *P. ferruginea*, from which it is also known by the absence of a rust-coloured tinge. There is often a yellowish-orange tinge about growing specimens; when dry often obscure brown; pores about  $\frac{1}{2}$  mm. across.

*Doubtful species.****Poria bathypora.* Rostk.**

Effused, white, margin thin, byssoid; pores rather large, cup-shaped, margin of dissepiments toothed.

*Polyporus bathyporus*, Rostk. in Sturm's Deutschl. Cr. Fl., p. 4, t. 59; Stev., Brit. Fung., p. 220.

On dead wood. In the British specimen referred by Berkeley to the above species, the pores are shallow and varying from  $\frac{1}{4}$ – $\frac{1}{2}$  mm. across.

**POLYSTICTUS. Fr.**

Pileus coriaceous, membranaceous, or rather spongy, indurmeous, i.e. cuticle thin and loosely fibrous. Tubes first appearing in the centre and successively developing towards the margin; at first superficial and distinct, then becoming deeper and more crowded, not stratose.

*Polystictus*, Fries, Nov. Symb., p. 54; Cke., Prae. Poly., Grev., p. 77, 1886.

*Polyporus*, of most authors.

Separated from the genus *Polyporus* in the old sense, by certain peculiarities of structure; the species are thin, usually flaccid, never hard and woody, mesopod, dimidiate, and imbricated, or effuso-reflexed and almost resupinate, pileus velvety or strigose, pores shallow, never stratose, towards the margin often sterile or with imperfect pores.

In *Polyporus*, as understood in the present work, and *Fomes*, the tubes are fully formed from the first, i.e., not at

first superficial and developing by degrees. *Polystictus* differs from *Trametes*, to which genus it is closely allied, by the unequal length of the tubes in the latter, which run to various depths into the flesh, whereas in *Polystictus*, as also in *Polyporus*, *Fomes*, and *Poria*, the tubes are of equal length, i.e. originate from the sporophore at one common level, a character seen in a section of the fungus through the sporophore and stratum of tubes.

### I. MESOPUS.

#### *Stem central.*

*Polystictus perennis*. Fr. (figs. 16, 17, p. 184.)

Pileus plano-infundibuliform, 1-3 in. across, thin, coriaceous, tough, velvety becoming smooth, zoned, clear cinnamon, then yellowish brick-red; stem firm but not hard,  $\frac{3}{4}$ -1½ in. high, thickened below, minutely velvety; pores very short, minute, angular, dissepiments becoming torn; at first with a white bloom, then naked; spores elliptical, hyaline,  $4.5 \times 2.5 \mu$ .

*Polyporus perennis*, Fries, Syst. Myc. i. p. 350; Sowerby, Brit. Fung., t. 192.

On the ground under trees, &c.; also on trunks. Pileus funnel-shaped or expanded and only umbilicate; stem central, whole plant elastic when growing.

Autumn and winter, remaining through the following summer in a growing state. Pileus 1½-2 in. broad, varying in depth of colour, cup-shaped when young, nearly plane when old; often confluent, zoned, soft and velvety and marked with little raised radiating lines, giving it a striated appearance; margin fimbriate or laciniated. Pores small, roundish or angular, at length torn, decurrent. Stem 1 in. high, varying greatly in thickness, very tough, velvety, bulbous at the base. (Berk.)

*Polystictus cinnamomeus*. Sacc.

Pileus rather corky, flaccid, plano-depressed or subinfundibuliform, velvety, becoming smooth, vivid cinnamon, shining, with evanescent brown zones,  $\frac{3}{4}$ -1½ in. across, pores rather large, angular, brownish-cinnamon, when dry fulvous; stem 1-1½ in. long, 2 lines thick, velvety, for the most part

attenuated downwards, but the base is sometimes tuberous, coloured like the pileus; flesh similarly coloured, rather nauseous; spores subglobose-ellipsoid, yellow,  $6-7 \times 4-5 \mu$ .

*Polyporus cinnamomeus*, Saccardo, *Michelia*, i. p. 362; Bresadola, *Trid.*, p. 89, t. 99.

*Boletus cinnamomeus*, Jacq. *Collect.* i. p. 116, t. 2.

On the ground under trees. Generally solitary, rarely subcaespitose. Distinct from *P. perennis* in the larger pores.

## II. APUS.

*Sessile, dimidiate.*

\* *Pileus dark coloured.*

*Polystictus versicolor*. Fries. (figs. 18, 19, p. 184.)

Pileus horizontal, thin, coriaceous, rigid, flat, slightly depressed behind, densely velvety, shining, with variously coloured concentric zones; pores very short, minute, dissepiments acute, becoming torn, white, then very pale buff.

*Polyporus versicolor*, Fries, *Syst. Myc.* i. p. 368; Sowerby, *Fung.*, t. 229.

On trunks, stumps, branches, &c. Often semicircular or flabelliform and imbricated, 2-3 in. across,  $\frac{1}{2}$  in. thick, margin thinner; pileus dark green with brown or orange narrow concentric zones, but colours variable. Hymenium plane, pores white, then cream-colour, often obsolete towards the margin, about  $\frac{1}{4}$  mm. across.

Variable; sometimes quite resupinate, or with the margin reflexed; more generally dimidiate and densely imbricated, occasionally spuriously stipitate, more or less lobed, villous, marked with regular concentric smooth shining zones of various colours, sometimes entirely white, and not unfrequently the whole surface is villous, and the zones mere depressions. (Berk.)

Tufted, subimbricated, thin, velvety, not strigose, margin often almost glabrous, pallid. Pores white, shining. The pileus is sometimes yellowish clay-colour; the zones also vary in colour through rufous, rusty, yellowish, white, &c.

*Var. fuscatus*. Fr.

Zoneless, brown, pores yellow, torn into teeth. (Fries.)

**Polystictus radiatus. Fr.**

Pileus corky, coriaceous, rigid, radiato-rugose, at first velvety, foxy, then glabrous and rusty-brown, margin spreading, wavy; pores minute, pallid, with a silvery sheen, at length rust-coloured.

*Polyporus radiatus*, Fries, Syst. Myc. i. p. 369; Cke., Hdbk., p. 278.

*Boletus radiatus*, Sow., t. 196.

On alder, hazel, &c.

Tawny specimens of *Polystictus versicolor* sometimes occur, very much resembling this species; but it appears from Sowerby's own specimens, as well as the opinion of Fries, to be altogether distinct. (Berk.)

Imbricated, about 1 in. across, ferruginous, radiating from the base, paler towards the sinuous margin, indistinctly zoned. Pores minute, rounded, white, or dingy yellow. (Fries.)

**Polystictus polymorphus. Rostk.**

Pileus 1 in. and more across, resupinate, effused, coriaceous, margin reflexed, crisped, glabrous, umber; pores rather large, angular, torn, pallid.

*Polyporus polymorphus*, Rostk., 4, t. 56; Stev., Brit. Fung., p. 209.

On branches, worked wood, &c. The above description is taken from the figure of Rostkovius, in the description the pileus is said to be pale bay.

\*\*\* *Pileus whitish, yellowish, or pale-tan.*

**Polystictus hirsutus. Fr.**

Pileus between corky and coriaceous, 1-3 in. across, convexo-plane, covered with dense hair-like pile, whitish all over, concentrically zoned; pores roundish, obtuse, white, then brownish; spores linear-elliptic,  $4-5 \times 2 \mu$ .

*Polyporus hirsutus*, Fr., Syst. Myc. i. p. 367; Stev., Brit. Fung., p. 210.

On trunks. The typical form varies as follows:—B. pores entirely white. C. Pores with the opening yellow, pure white within. D. Pores obtuse, angular. E. Margin of the pileus rust-colour. F. Pileus becoming blackish.

With the habit and general appearance of *Polystictus versicolor*, but quite distinct; pores about  $\frac{1}{3}$  mm. across.

Often imbricated and continuously effused behind. Distinguished from *P. velutinus* by the coarsely strigose pileus and the different spores.

Both surfaces almost plane, reniform, often imbricated, about 2 in. long,  $1\frac{1}{2}$  in. broad, zones coloured like the pileus. Substance tough, soft. Pores of medium size, equal, becoming grey; sometimes yellow, but always internally white. (Fries.)

***Polystictus velutinus*. Fr.**

Horizontal, laterally attached, thin, corky-coriaceous then rigid; pileus velvety, indistinctly zoned, white, becoming yellowish, margin straight, acute; plane on both surfaces; pores short, subangular, white, dissepiments thin; spores broadly elliptic-oblong, obliquely apiculate,  $5 \times 4 \mu$ .

*Polyporus velutinus*, Fries, Syst. Myc. i. p. 368; Berk., Outl. Fung., p. 248.

On trunks, stumps, &c. Sometimes imbricated, 1-3 in. across, about  $\frac{1}{2}$  in. thick. Moist when young, then becoming hard; pileus not shining, as in *Polystictus versicolor*, from which it is also distinguished by the whitish colour. Pores about three in 1 mm.

More or less imbricated. Pileus 2-3 in. broad, velvety, undulated, obscurely zoned, between corky and leathery, margin thinner than in the following species (= *Polystictus versicolor*), shrinking and curling inwards when dried; colours various, whitish with a cottony margin, yellowish-fuscous, or brownish-grey; the latter is most common. Pores whitish or yellowish, minute, round, very short, often disappearing near the margin. (Grev.)

Pileus convex when young, then depressed, thin, white or pale yellowish, about 2 in. across. Pores small, equal, dingy, white or yellowish. (Fries.)

***Polystictus gossypinus*. Lév.**

White. Pileus 1-4 in. across, coriaceous, effuso-reflexed, flattened, thin, tomentose, zoneless; flesh thin, white; tubes 1-2 lines or more long, pores labyrinthiform, then angular, rather large, greyish, dissepiments thin, more or less torn.

*Polyporus gossypinus*, L  veille, Ann. Sci. Nat., 1843, p. 124; Stev., Brit. Fung., p. 209.

On trunks, furze stems, &c. Tubes very irregular, sometimes almost resembling plates or teeth, three or four times as long as the thickness of the flesh of the pileus.

**Polystictus abietinus.** Fr.

Pileus thin, coriaceous, flaccid, effuso-reflexed, or sometimes entirely resupinate, silky-villose, greyish-white or with an ochraceous tinge, indistinctly zoned; pores shallow, unequal; dissepiments torn, violet, becoming pale; spores elliptic-oblong,  $4 \times 1.5 \mu$ .

*Polyporus abietinus*, Fries, Syst. Myc. i. p. 370; Stev., Brit. Fung., p. 211.

On trunks of decaying fir-trees. Pilei 2-3 in. long, often much more, and in many instances more or less completely covering the trunk, either completely resupinate, with the margin variously lobed, owing to the confluence of several individuals, or with the upper margin more or less reflexed, and then often densely imbricated. Pores  $\frac{1}{2}$ -1 mm. in length, much torn, violet, then bleached.

Plants often growing in so crowded a manner as to cover a considerable extent of surface. Pileus circular, entire, or somewhat lobed, about 2 in. in breadth, thin, coriaceous, resupinate at first, at length sometimes reflexed and undulate at the margin, villose, whitish, more or less impressed with obscure narrow zones. Hymenium at first of a pale violet colour, becoming brownish in the centre. Pores while young roundish, entire, short, quickly assuming an irregular lacerate and sinuous form. The first commencement of this beautiful species is a minute plane tuft of radiating, silky filaments, which begins to show a few central, roundish, entire pores, while scarcely  $\frac{1}{4}$  in. in breadth; in maturity, the pores become torn and toothed in every direction, and often entirely lose the character of a *Polyporus*, except at the extreme margin, where they commonly preserve their generic character. In decay the white of the pileus becomes tinged with green, the whole plant dries up, and the pores quite lose their violet colour. (Grev.)

**Polystictus Wynnei.** B. & Br.

Pileus coriaceous, effuso-reflexed, silky, variously incrust-

ing, clay-colour, zoned with raised lines; pores minute, angular, white.

*Polyporus (Inodermei) Wynnei*, B. & Br., Ann. Nat. Hist., n. 807; Berk., Outl., p. 279.

Running over twigs, grass, &c.

Thin, incrusting various substances, with the margin more or less broadly reflected, tan-coloured, sericeous, and marked with raised lines; pores  $\frac{1}{8}$  in. across, angular, white, acquiring a slight tint like that of the pileus in drying. This species has somewhat the habit of *P. amorphus*, but is not of so fleshy a texture. Specimens have been submitted to Fries, who says that he is unacquainted with the species, and I have therefore no hesitation in proposing it as new. (B. & Br.)

#### FOMES. Fries.

Pileus hard and woody from the first, texture consisting of interwoven hyphae, covered with a hard, rigid, crustaceous cuticle, zoneless, but often concentrically sulcate; perennial, forming successive strata, but the latest formed stratum alone living.

*Fomes*, Fries, Nov. Symb., p. 31; Cooke, Praec., p. 117.

*Polyporus*, most authors.

Stem central, lateral, dimidiate, or sometimes entirely resupinate. The present genus includes those species included in *Polyporus* as understood in the old sense, characterised by a hard, woody, often concentrically sulcate pileus, and by the strato-se tubes, resulting from the perennial nature of the species.

#### ANALYSIS OF THE SPECIES.

##### I. PLEUROPUS.

Stem lateral.

##### II. APUS.

Sessile; dimidiate, effuso-reflexed, or almost entirely resupinate.

\* Pileus whitish.

\*\* Pileus rose-colour.

\*\*\* Pileus ferruginous, brownish, tawny, &c., always coloured.

## I. PLEUROPUS.

*Stem lateral.***Fomes lucidus. Fr.**

Horizontal, flabelliform or subreniform, laterally stipitate, pileus 2-6 in. across, corky then hard and woody, sulcato-rugose, blood-red with a chestnut tinge, polished, shining, pores  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, minute, whitish then cinnamon; stem variable in length, rugose, coloured and polished like the pileus; spores  $7 \times 5 \mu$ , brown.

*Polyporus lucidus*, Fries, N. S., p. 61; Berk., Outl., t. 16, f. 2.

On trunks, &c, Stem varying from less than 1 in. to 6 in. long, readily known by the deep-red pileus and stem that are highly polished, as if varnished. Pores averaging  $\frac{1}{4}$  mm. across.

Pileus 2-6 inches broad, generally more or less oblique, very variable in thickness, rugose, often marked with concentric grooves or ridges, chocolate-brown, the edge often tawny or bright chestnut, shining as if varnished, with occasionally a vitreous appearance. Pores very minute, subrotund, pale, equal, at length cinnamon. Stem 6-10 inches high, 1 inch or more thick, rugose, marked occasionally with transverse lines of growth, shining like the pileus; sometimes obsolete. Both the pileus and stem are occasionally marked with minute wavy wrinkles. A most beautiful and highly curious species, occurring in most parts of the world. (Berk.)

Pileus of a coriaceous or corky, firm substance, very inconstant in its form, pileus 4-8 inches in breadth, usually more or less reniform, sometimes flabelliform, rarely orbicular; nearly plane, rugose, and marked with concentric lines or grooves, glabrous, shining as if highly varnished. Colour yellowish at first, then bright chestnut, in old age almost black. Flesh thick, very firm, delicately fibrous, pale, at length reddish; the pores of the same colour, equal, roundish, very minute, either short or rather long, according to circumstances. Stipes either almost wanting, or 6-10 inches in height, mostly erect and lateral, rarely central or ventrical. It is often an inch or more in thickness, very hard, of the



same colour and shining appearance as the pileus. I have had no opportunity of tracing the growth of this fungus, but Mr. Purton informs us, that the lacquered appearance is occasioned by a thick, glutinous, reddish juice, which exudes from every part of the pileus and stipes, and soon dries. (Grev.)

## II. APUS.

*Sessile, dimidiate or effuso-reflexed.*

\* *Pileus whitish.*

### *Fomes ulmarius.* Fr.

Pileus white, effused, sometimes with an obtuse free margin, corky, then woody and hard, cuticle crustaceous, tuberculose, smooth; flesh white; tubes stratosed, whitish, pores minute, rounded, yellowish or at first tawny, spores elliptical,  $7-8 \times 4 \mu$ .

*Polyporus ulmarius*, Fries, Syst. Myc. i. p. 365; Berk., Engl. Fl., vol. v. p. 142; Cooke, Hdbk., p. 276.

On old elm trunks.

Effused, with an obtuse, occasionally free margin, forming a new stratum every year, so that a section gives several distinct layers of pores and flesh, alternating with each other; flesh white; pores minutely tawny; substance when dry, hard and corky. (Berk.)

Pileus 4-10 in. across, often yellowish with age. Tubes  $\frac{1}{2}-\frac{3}{4}$  in. long when old and stratified; pores about  $\frac{1}{3}$  mm. across.

### *Fomes populinus.* Fr.

White, pileus between corky and woody, rigid, zoneless, villose, margin obtuse; white within; pores minute, short, rounded.

*Polyporus populinus*, Fries, Syst. Myc. i. p. 367; Fries, Hym. Eur., p. 564.

On white poplar.

Imbricated, grown together at the decurrent base, transversely dilated. I have the same on black poplar nearly solitary, pileus at first floccoso-mealy, very hard and woody when old. Both are white within, not stratosed. (Fries.)

**Fomes cytisinus.** Berk.

Dimidiate, imbricated, 8-12 in. long, 4-6 in. broad, pileus coarsely tuberculated, hard, woody, margin slightly incurved, flesh about 1 in. thick behind, becoming thin towards the margin, fibrous but hard and compact, whitish; tubes 1 in. long behind, shorter in front, pores minute, rounded, whitish; spores subglobose, 5  $\mu$ . diameter.

*Polyporus cytisinus*, Berk., Engl. Flora, vol. v. p. 142; Berk., Outl., p. 247; Stev., Brit. Fung., p. 207.

*Boletus suberosus*, Sow., t. 288.

On laburnum.

Imbricated, above a foot across, dimidiate, quite smooth (at least when dry), but coarsely tuberculated. Substance slightly zoned, very thick and close, pale, evidently composed of two or three successive layers. This is certainly the same as *Boletus suberosus*, Sowerby. (Berk.)

**Fomes connatus.** Fr.

Between corky and woody, effuso-reflexed, densely imbricated, growing into each other, velvety, greyish-white; flesh white, zoned; tubes strатose, pores minute, roundish, white.

*Polyporus connatus*, Fries, Epicr., p. 472; Cooke, Hdbk., p. 278.

On old trunks. Often running up the trunk for one or two feet in an imbricated manner, the pilei growing into each other; margin usually obtuse, often only slightly reflexed from a continuous, effused basal portion. From 2-4 in. across or more.

The colour of the pores varies when viewed in different directions, in some positions glistening with a satiny sheen.

**\*\* Pileus rose-colour.****Fomes roseus.** Fr.

Somewhat caespitose. Pileus 2-5 in. broad,  $\frac{1}{2}$ -1 in. thick, corky, inclining to woody, hard, triangular, even, somewhat banded, rose-colour, more or less obscured by a greyish-black bloom; internally floccoso-fibrous, rose-colour; pores minute, round, rose-colour; spores 6  $\mu$ . long.

*Polyporus roseus*, Fries, Syst. Myc. i. p. 372; Stev., Brit. Fung., p. 206.

On worked wood.

Rose-colour without and within, but tinged with smoke-colour, especially the pileus, 2-4 inches broad,  $\frac{1}{2}$ -1 inch thick. Margin subacute. (Fries.)

\*\*\* *Pileus ferruginous, brownish, tawny, &c., always coloured.*

**Fomes fomentarius. Fr.**

Hoof-shaped, 4-7 in. across, 3-5 in. thick at the base; pileus distantly concentrically sulcate, glabrous, opaque, fuliginous, or dingy brown, cuticle thick, hard, persistent, margin at first with a white bloom, then ferruginous; flesh rather soft, compactly floccose, foxy rust-colour; tubes very long,  $\frac{1}{2}$ -2 in. or more, distinctly stratoses, ferruginous, pores subangular, about  $\frac{1}{4}$  mm. across, powdered with white at first then ferruginous; spores brown, elliptical, base abruptly truncate,  $6 \times 3.5-4 \mu$ .

*Polyporus fomentarius*, Fries, Syst. Myc. i. p. 374; Stev., Brit. Fung., p. 204.

Plane below, tapering towards the margin all round from the very thick base, hence more or less triangular in section.

Sometimes when old, especially when growing on birch, nearly white, occasionally tinged with bright yellow. (Berk.)

In the young plant the upper surface of the pileus is brown, with a thick rounded white edge. Pores varying from white to brown. It throws off most copiously, from every part of its surface, a powder of the colour of Spanish snuff; this alone will distinguish it from every other species. It is also an annual; *Polyporus ignarius*, on the contrary, is a perennial. (Purton.)

Large, externally hard, with grey or blackish zones, especially near the margin. Pores stratoses, forming long, very slender tubes, naked. Substance spongy, foxy, good for making tinder. (Fries.)

Pileus large, 3-8 in. in diameter, externally hard, somewhat banded, particularly towards the margin, with grey and dark zones, strongly resembling a horse's hoof, sometimes much flattened. Pores stratified, or in a succession of layers, long, very slender, naked; substance reddish-brown and spongy. (Grev.)

**Fomes igniarius.** Fr. (fig. 20, p. 184.)

Pileus at first tuberculoso-globose, immarginate, even, with a thin, flocculose, adpressed hoary covering, thin hoof-shaped, ferruginous then blackish-brown, opaque, cuticle very hard, uneven; flesh zoned, ferruginous, very hard, margin rounded; tubes 1-2 in. long, very small, stratose, convex, cinnamon, when old filled with white mycelium, pores  $\frac{1}{4}$ - $\frac{1}{2}$  mm. across, rounded, at first hoary; spores subglobose, hyaline, 6-7  $\mu$ . diameter, cystidia few, 10-25  $\times$  5-6  $\mu$ .

*Polyporus igniarius*, Fries, Syst. Myc. i. p. 375; Stev., Brit. Fung., p. 205.

On trunks of various trees.

Differs from *Fomes fomentarius* and *F. nigricans* in its entire nature and life-history. The new spring growth adds to the entire substance of young specimens, in larger specimens adds mostly to the margin and hymenium. (Fries.)

Pileus somewhat like a horse's hoof, irregular, rugose, banded with convex zones, reddish-brown, at length blackish, smooth, hard throughout, and not fit for converting into amadou. Pores very minute, slender, yellowish, or greenish-grey, at length cinnamon. The pileus is apt to change its form according to its situation; and when growing on the under surface of a horizontal cherry-tree branch, it becomes as it were perpendicular, and the pores form a horizontal and circular surface beneath. (Grev.)

**Fomes nigricans.** Fr.

Hoof-shaped or pulvinate, very thick, 4-6 in. broad, 3-4 in. thick, at the base; pileus densely and concentrically sulcate, cuticle very hard, with a crusty varnished layer, black, smooth, shining, margin very obtuse, ferruginous; flesh very hard, ferruginous; tubes elongated, 2-3 in., distinctly stratose, ferruginous, pores  $\frac{1}{2}$  mm. across, obsoletely angular, naked from the first; spores elliptical, both ends rounded, brown, 5  $\times$  3  $\mu$ ; cystidia abundant, 10-25  $\times$  6  $\mu$ .

*Polyporus nigricans*, Fries, Syst. Myc. i. p. 375; Stev., Brit. Fung., p. 204.

On living and dead birch. The blackish, lacquered, shining pileus distinguishes the present species amongst its allies, but a form is described by Fries with the pileus

triangular, rugose, opaque, which approaches *Fomes igniarius*.

**Fomes salicinus. Fr.**

Woody, very hard, undulate, the greater portion usually resupinate, with a narrow, undulated, smooth, free margin, that is obtuse and patent, cinnamon then greyish; pores minute, rounded, ferruginous-cinnamon, as is also the flesh; spores  $5 \times 3 \mu$ ; cystidia plentiful,  $12-35 \times 6 \mu$ .

*Polyporus salicinus*, Fries, Syst. Myc. i. p. 376; Stev., Brit. Fung., p. 206.

On willow trunks. Pileus 12 in. and more across. Related to *F. fomentarius* and *F. igniarius*. Entirely resupinate, or in vertical positions with the upper margin narrowly reflexed. There is a form with the free margin striato-plicate.

A foot or more long, often interrupted, glabrous, woody. Pores rounded, equal, or when growing in an oblique direction, gaping. (Fries.)

**Fomes fraxineus. Fr.**

Pileus between corky and woody, glabrous, rather flattened, zoneless, white when young, then reddish-brown, at first even, then concentrically sulcate, pale within; tubes short, pores minute, rusty-red, at first covered, as is also the margin, with a white pubescence; spores subglobose,  $6-7 \mu$  long.

*Polyporus fraxineus*, Fries, Syst. Myc. i. p. 374; Stev., Brit. Fung., p. 207.

On old ash trunks.

Variable in form, softer when young, but not fleshy, truly perennial. (Fries.)

Solitary or imbricated. Smell strong and penetrating. (Berk.)

Pileus 3-9 inches and more broad; tubes 2-4 lines long, pores about  $\frac{1}{2}$  mm. across.

**Fomes pectinatus. Klotzsch.**

Pileus rusty-brown, corky, inclining to woody, hard, triangular, concentrically lamelloso-plicate, tomentosely scaly; margin and the short, minute, obtuse pores, pale yellowish-red, naked.

*Polyporus pectinatus*, Klotzsch, Linnaea, viii. p. 485; Stev., Brit. Fung., p. 205.

On wood.. Pileus 1-2 in. broad. In the original description it is queried as to whether the pores and margin are always naked.

**Fomes vegetus. Fr.**

Pileus horizontal, 8-12 in. broad, flattened, glabrous, opaque, brown, concentrically sulcate, annual zone broad, flesh floccose, loose, very thin, coloured; cuticle of the second year thick, separable; tubes umber, stratose, seceding, each yearly stratum separated from the preceding by a floccose layer; mouths of the tubes minute, roundish, white at first.

*Polyporus vegetus*, Fries, Epicr., p. 464; Cooke, Hdbk., p. 274.

On trunks of lime, elm, &c. Amongst the largest of species, often reaching a foot across during the first season. Allied to *Fomes applanatus*, from which it is distinguished by the very thin flesh, and the distinctly stratose tubes, each annual formation being separated from the preceding by a floccose layer. Plane below, at first white, margin very smooth, shining, sterile, narrow.

**Fomes fulvus. Fr.**

Exceedingly hard, convex above and below, attached by a broad base, hence triangular in section; pileus even (not concentrically zoned), at first villous, fulvous then greyish, flesh subferruginous; pores short, about  $\frac{1}{4}$  in. rounded, minute, cinnamon, at first with a greyish-yellow bloom.

*Polyporus fulvus*, Fries, Epicr., p. 565; Stev., Brit. Fung., p. 205.

On decaying trunks, especially poplar. Pores not distinctly stratose.

**Fomes annosus. Fr.**

Very irregular in form, often horizontal and imbricated; pileus convex, becoming plane, tuberculoso-zoned, coarsely radiately rugulose, during the first year brown, silky, margin whitish, second season covered with a glabrous blackish-brown rigid crust; flesh rather thick, whitish; pores at first pure white, about  $\frac{1}{2}$  in. deep, medium size; spores colourless, elliptic-oblong,  $6 \times 4 \mu$ .

*Polyporus annosus*, Fries, Syst. Myc. i. p. 375; Stev., Brit. Fung., p. 208.

About the roots of decayed trees, stumps, &c., especially pine. Very irregular in growth, often forming a continuous stratum following the irregularities of the wood, and entirely resupinate, at others with several pilei more or less imbricated. Pileus hard, coarsely radiato-rugose, margin and pores white.

**Fomes applanatus.** Wallr.

Horizontal, semicircular, attached by a broad base; pileus flattened, tuberculose, indistinctly zoned, outer crust rigid, at length brittle, cinnamon or brown, then often greyish with age; rather shining, margin tumid, white, then cinnamon; flesh thick, floccose and soft; stratum of pores short, subferruginous, exceedingly minute, roundish, surface of porous stratum pure white, brownish when bruised.

*Polyporus applanatus*, Wallr., D. Kr. Fl. ii. p. 591; Berk., Outl., p. 245.

On trunks. Sometimes imbricated, 2 in. or more in thickness, 4-8 in. across; distinguished by the brown, tuberculose, and vaguely concentrically zoned, glabrous pileus, and the even white hymenial surface with very minute pores.

**Fomes conchatus.** Fr.

Thin, rigid, effuso-reflexed, the reflexed portion somewhat shell-shaped; pileus dark brown, concentrically grooved, minutely silky, margin acute, pores short, very minute, coloured like the pileus; spores 4-5  $\mu$ ; cystidia scanty, 15-30  $\times$  7-9  $\mu$ .

*Polyporus conchatus*, Fries, Syst. Myc. i: p. 376; Stev., Brit. Fung., p. 206.

On trunks of willow, &c. From 2-3 in. across, about  $\frac{1}{4}$  in. thick, hard, altogether inside and outside dark brown, with a tinge of ferruginous or chocolate; often imbricate, sometimes entirely resupinate.

Closely allied to *F. igniarius*, but smaller and thinner, closely concentrically sulcate, concave below, margin acute. (Fries.)

**Fomes variegatus.** Secr.

Pileus between corky and woody, rather flattened, even, glabrous, zoneless, shining, orange variegated with bay;

pallid within; tubes short, pores rounded, minute, unequal, torn, yellowish.

*Polyporus variegatus*, Secretan, Myc. Fl. Suis., n. 45; Fries, Hym. Eur., p. 563; Sow., t. 368; Cooke, Hdbk., p. 277.

On trunks. Sowerby's figure has the pilei dimidiate and imbricated, 3-5 in. across, margin wavy, pileus tawny orange, attached by a broad decurrent base.

**Fomes ribis. Fr.**

Horizontal, imbricated, coriaceous, rigid, flattened, almost even, velvety, ferruginous then umber, margin acute; pores short, minute, naked, and with the thin flesh, fulvous.

*Polyporus ribis*, Fries, Syst. Myc. i. p. 375; Stev., Brit. Fung., p. 206.

On currant and gooseberry bushes. Imbricated, from 2-4 in. across, pores about 1 line long. Perennial, stratosse. Pileus often indistinctly zoned, but not concentrically sulcate as in *F. conchatus*; the latter is not so distinctly velvety as the present species.

Imbricated, 3 in. or more broad, thin, zoned and velvety, of a rather rich tawny-brown, the margin paler and brighter. Substance soft, silky, fit for making tinder. Pores short, larger than in the foregoing species (= *Fomes ignarius*), brownish-grey. (Berk.)

Imbricated, unequal, up to 4 in. broad, substance spongy, soft, foxy-yellow, not thick, the base often thinner than the margin. Velvety and yellowish when young, then almost glabrous, indistinctly zoned. Pores plane. 1 line long. (Fries.)

**Fomes carneus. Nees.**

Pileus effuso-reflexed or dimidiate, 2-6 in. long, 1-2 in. broad, woody, hard, rather thin, glabrous, zoneless, radiately rugose, dingy flesh-colour, flesh similarly coloured; tubes short, stratosse in old specimens, pores roundish, minute, decurrent at the expanded base, paler than the pileus.

*Polyporus carneus*, Nees, in Nov. Act. Nat. Curios. xiii. t. 3; Stev., Brit. Fung., p. 208.

On trunks, stumps, &c. Pores  $\frac{1}{4}$ - $\frac{1}{2}$  mm. across. Often extending for several inches, the reflexed portion remaining narrow, imbricated, rarely solitary. Smaller and thinner



than *Fomes frazineus* or *F. variegatus*, but hard and perennial, resembling *F. annosus* in the radiately rugose hard pileus, but quite distinct in the absence of the white sterile margin, &c.

***Fomes resupinatus*. Massee.**

Coriaceous but rather spongy, sessile, often broadly effused, and either plane or furnished here and there with nodulose outgrowths; altogether ferruginous, flesh very thin, fibrous; tubes stratose, 2-5 mm. long, openings nearly circular.  $\frac{1}{4}$ - $\frac{1}{2}$  mm. across, dissepiments thin, entire, acute; spores colourless, elliptical,  $4 \times 1.5 \mu$ .

*Boletus resupinatus*, Bolton, Fung. Halifax, t. 165, p. 165.

*Fomes spongiosus*, Sacc., Syll., vi. n. 5525.

*Boletus spongiosus*, Persoon, Syn., p. 543 (according to Saccardo).

On trunks and branches. Often broadly incrusting, closely adnate, the hymenium often more or less nodulose from the outgrowth of abortive or imperfectly developed rudimentary pilei; in other examples the hymenium remains plane and even, and then resembling in general appearance and habit *Fomes ferruginosus*, Fr., but at once distinguished on a microscopic examination by the absence of large, coloured cystidia projecting from the hymenial surface.

Saccardo, in Sacc., Syll. Fung. vi. n. 6525, has given the present species as a synonym under *Fomes spongiosus*, Pers.; there is no evidence, however, that the two are identical, whereas there are specimens in the Kew Herbarium agreeing exactly with Bolton's species, and determined as such by the Rev. M. J. Berkeley.

This curious *Boletus* (= *Fomes*), most frequently creeps or spreads upon its bark, sometimes it is formed into lumps of a rude turban-shape; in either case it consists of a thin brown crust, which closely embraces the wood on which it grows, and serves as a base or groundwork to the tubes.

The tubes are long, erect, and constitute almost the whole substance of the plant; in spreading or creeping specimens, the margin is unequally lobed and blunt; the surface made uneven by swelling bunches; the colour, like all the other parts, is a rusty brown. The pores round, but are too small

for the inspection of the naked eye. The length of the tubes is different in the creeping and the turbanated specimens, being shorter in the first, longer in the last variety.

I gathered specimens of this plant on dry decayed hazel boughs, near Burks Hall, in February, 1790. (Bolton.)

**Fomes ferruginosus. Mass.**

Broadly effused, closely adnate, from  $\frac{1}{2}$ –1 in. thick, surface either even and nearly plane, nodulose, or with numerous more or less reflexed, imbricated, imperfectly formed pilei, bright ferruginous-brown, becoming dusky ferruginous when old, margin sterile; pores subrotund, torn, very long; spores  $6-7 \times 4 \mu$ ; cystidia numerous, acuminate, clear brown,  $30-40 \times 5-6 \mu$ .

*Polyporus ferruginosus*, Fries, S. Myc. i. p. 378; Hym. Eur., p. 571; Stev., Brit. Fung., p. 212.

*Polyporus cryptorum*, Fries, Syst. Myc. i. p. 376.

*Boletus cryptorum*, Bull., t. 478.

On trunks, posts, &c. Often very broadly effused, thickness variable, flesh almost obsolete. When growing and at its best, the barren margin is very bright rust colour. Pores 3–4 in the space of 1 mm. The bright yellow-brown, spine-like cystidia are very abundant in the hymenium. All the species of *Fomes* having the hymenium furnished with cystidia have been arranged under a new genus—*Mucronoporus*—by Ellis.

At first appearing under the form of a confervoid stratum, which gradually thickens and acquires pores in the centre; generally wholly resupinate, but occasionally slightly reflexed. Pores minute, roundish, unequal; specimens sometimes occur many inches in length, and in parts  $\frac{1}{2}$  in. thick, from several individuals having become confluent. (Berk.)

**POLYPORUS. Mich.**

Central or lateral stemmed, dimidiate, &c. Pileus fleshy, tough, rather soft and moist, at length becoming harder (rarely of a cheesy texture and fragile), externally neither sulcate nor zoned, but the internal texture consisting of

radiating fibres often more or less zoned. Pores never stratosed. Sporophore descending into the hymenophore and forming the trama (or dissepiments), hence the tubes (hymenophore) are not separable from the sporophore; pores at first obsolete or none, then rounded, angular, or torn.

*Polyporus*, Micheli, Gen., p. 129, emended by Fries, Nov. Symb., p. 30; Cke., Praec., Grev., p. 80, 1886.

Distinguished from *Polystictus* by the thicker flesh, which is soft and moist at first, also by the absence of zones on the pileus.

The species of *Polyporus* with elongated sinuous pores are distinguished from *Daedalea* by the flesh being soft and juicy at first, the slender narrow pores, thinner dissepiments, and absence of a differently coloured trama. *Fomes* differs from the present genus in the pileus being hard and woody from the first, and in the stratosed tubes.

### ANALYSIS OF THE SPECIES.

#### I. MESOPUS.

Stem simple, central or excentric, not black at the base.

#### II. PLEUROPUS.

Stem simple, excentric or lateral, base black.

#### III. MERISMA.

Numerous pileoli borne on a common simple or much-branched stem or short, thick tubercle.

#### IV. APUS.

Pileus sessile, dimidiate or effuso-reflexed.

\* Pileus ferruginous, brownish, or dark fuliginous.

\*\* Pileus white, pale ochraceous, yellowish, &c.

## I. MESOPUS.

*Stem quite distinct, vertical or excentric, simple, not black at the base. Pileus entire or excentric.*

**Polyporus leucomelas. Fr.**

Pileus 2-5 in. across, expanded, margin often irregular, silky or minutely squamulose, smoky black, sometimes with dark olive tinge, flesh thick except at the extreme, acute margin, whitish; pores about  $\frac{1}{2}$  in. deep, rather large, unequal, greyish, decurrent; stem 1-3 in. long, stout, rather tomentose, similar in colour or paler than the pileus; spores cylindric-fusoid, pale brown,  $10-12 \times 4-5 \mu$ .

*Polyporus leucomelas*, Fries, Syst. Myc. i. p. 346; Stev., Brit. Fung., p. 187.

In pine woods, &c. Pileus often deformed, rather fragile, stem variable in length, flesh turning red when bruised, pores become blackish in drying, also inside of stem. Spores of the *Boletus* type. Pores about  $\frac{1}{2}$  mm. diam.

**Polyporus lentus. Berk.**

Pileus 1-2 in. across, thin, tough, coriaceous, umbilicate, ochraceous or pallid, zoneless, squamulose especially when young; pores shallow, large, angular, often slightly elongated radially, decurrent, dissepiments thin; stem central or excentric, 2 lines or more thick,  $\frac{1}{2}$ -1 in. long, colour of the pileus, variable, straight or curved, hispid or furfuraceous; spores elliptic-fusiform, colourless,  $12 \times 4-5 \mu$ .

*Polyporus lentus*, Berk., Outl., p. 237, t. 16, f. 1; Stev., Fung., p. 187.

On wood, furze stems, &c. Known amongst the British mesopod forms by the large pores that average 1 mm. or more in size. The pileus is sometimes entirely destitute of scales, and the pores decurrent to the base of the stem.

Pileus  $1\frac{1}{2}$  in. broad, convex, or slightly depressed, at first furfuraceo-squamulose, reddish-brown, at length nearly smooth, ochraceous, the margin fibrilloso-squamose, of a tough fleshy substance. Pores large, rather deep, decurrent, roundish or subquadrate, at first white, the edges slightly toothed and powdered with the white oblong sporules. Stem  $\frac{1}{2}$ -1 in. high,  $\frac{3}{8}$  in. thick, central, covered with pores to the very base, only the lower ones are abortive, and their inter

stices pilose or distinctly furfuraceous, nearly of the colour of the pileus. A very elegant and distinct fungus, and quite unlike any with which I am acquainted, resembling somewhat in habit certain species of Fries' subgenus *Lentinus*. (Berk.).

***Polyporus brumalis*. Fr.**

Pileus 1-4 in. across, thin, pliant then coriaceous and rigid, more or less umbilicate, during the first year smoky-umber and densely villous, in the second year minutely scaly, becoming smooth and paler; pores shallow, large, angular and usually elongated radially, white then yellowish, dissepiments thin, very minutely toothed at the margin; stem central, 1-2 in. long, 2-4 lines thick, coloured like the stem, velvety or squamulose; spores colourless, linear-oblong, sometimes slightly curved,  $5-6 \times 2 \mu$ .

*Polyporus brumalis*, Fries, Syst. Myc. i. p. 348; Stev., Brit. Fung., p. 188.

On dead branches. Pileus becoming rigid and incurved when dry, the margin often fimbriate when young; pores more or less decurrent, about  $\frac{1}{4}$ - $\frac{3}{4}$  mm. long. Distinguished in all its forms from *P. lentus* by the much smaller spores.

Autumn and winter, reviving in the spring. (Klotzsch.)

Pileus 1-4 in. broad, nearly plane, depressed in the centre, dingy, clothed with minute scales, at length fawn-coloured and nearly smooth. Pileus very slightly angular, white, the dissepiments rather thick. Stem  $\frac{3}{4}$ -2 in. high, 2-4 lines thick, central, velvety, hirsute or squamulose. (Berk.)

***Polyporus fuscidulus*. Fr.**

Pileus 1-2 $\frac{1}{2}$  in. across, thin, pliant, rather coriaceous, convexo-plane, not umbilicate, zoneless, even, smooth, yellowish-brown; flesh thin, yellowish-white; pores shallow, subangular, yellowish, largest and slightly elongated near the stem, not decurrent, dissepiments thin, margin quite entire; stem 1-2 in. long, 2 lines thick, equal, quite smooth, brown or yellowish; spores elliptic-oblong, colourless,  $5-6 \times 2 \mu$ .

*Polyporus fuscidulus*, Fries, Epicr., p. 431; Stev., Brit. Fung., p. 188.

On bits of wood, amongst chips, &c. Close to *P. brumalis*, from which it is distinguished by the glabrous stem and pileus, and the quite entire edge of the dissepiments. The

pores average about  $\frac{3}{4}$  mm. in length near the stem, becoming smaller and angularly round near the margin.

**Polyporus leptcephalus. Fr.**

Pileus about 1 in. across, tough, then coriaceous, thin, convexo-plane, glabrous, even, zoneless, pale then fawn-colour, margin rather wavy, flesh white; pores adnate, subrotund, minute, whitish; stem about 1 in. long, glabrous, pallid.

*Polyporus leptcephalus*, Fr., Syst. Myc. i. p. 349; Berk., Outl., p. 237.

On trunks. Appears to be close to *P. fuscidulus*, perhaps distinct in the smaller pores, but I have not seen an authentic specimen, hence cannot give spore measurements, &c. All the specimens that I have seen under this name belong to *P. fuscidulus*.

Pileus 1 in. broad, tawny-bay, flat, thin, leather-like; pores white, very short; stem pale or reddish-brown, thick as a crow-quill, and about  $\frac{1}{2}$  in. high. (Withering.)

**Polyporus Schweinitzii. Fr.**

Pileus 6-9 in. across, tomentose, rugged, and matted into little heaps, dark brown with a ferruginous tinge, flesh thick, spongy and soft, fibrous, bright brown; stem thick, very short, bright brown, sometimes almost obsolete; tubes about  $\frac{1}{4}$  in. long, openings large, irregular and variable in form, yellow with a tinge of green; spores elliptical, obliquely apiculate, pale yellow,  $7-8 \times 4 \mu$ .

*Polyporus Schweinitzii*, Fries, Syst. Myc. i. p. 351; Fries, Icones, pl. 179, fig. 3; Stev., Brit. Fung., p. 189.

In pine woods, &c., about roots and stumps.

Distinguished from such species as *P. hispidus*, *spongia*, &c., by the central stem, which is, however, sometimes almost obsolete; it is never attached by a broad, lateral base.

Openings of tubes often elongated and sinuous,  $\frac{2}{3}-1\frac{1}{2}$  mm.

Very large, 8 in. and more broad, sometimes regular and almost plane, slightly depressed, sometimes irregular in form and dimidiate, the pilei growing into each other and incrusting, at first with a foxy tomentum, which colour is soon confined to the margin, when old entirely dull brown; flesh when the plant is growing very soft and spongy, then hardened, fragile when dry, rhubarb-colour becoming brownish. (Fries.)

**Polyporus rufescens. Fr.**

Pileus 3-4 in. across, soft and spongy, unequal, strigose or hairy, flesh-colour, flesh thin, coloured; pores rather short, large, more or less sinuated and torn, pale flesh-colour; stem short, subcentral or almost lateral, irregular in form; spores broadly elliptical, almost colourless,  $6 \times 4-5 \mu$ .

*Polyporus rufescens*, Fries, Syst. Myc. i. p. 351; Stev., Brit. Fung., p. 189.

*Boletus biennis*, Sow., t. 191.

On stumps, &c. Distinguished amongst the hairy, soft-fleshed species by the whitish-pink hymenium, and the large, sinuous, torn pores that are often 1 mm. wide, and 2-4 mm. long.

Habit of growth resembling that of *Polyporus Schweinitzii*, but it is smaller, softer, and different in colour both externally and internally. (Fries.)

The stipes (occasionally central and covered with naked pores) is somewhat tomentose. Pores varying into sinuses and labyrinths very irregularly. The pileus is rather hispid. It hardens in drying, becoming woody. (Sow.)

In the two specimens figured by Sowerby, the stem is in both instances distinctly lateral, about  $1\frac{1}{2}$  in. long, pileus pale brown, pores pale pink.

Pileus convex when young, at length plane or even depressed, velvety or hispid, 1-3 in. broad, irregular, furnished underneath with large, irregular, very flexuous or labyrinth-like pores, greyish or flesh-coloured. Stipes when present very irregular, unequal, even grotesque, 1-2 in. high, of various thickness, ferruginous, sometimes wanting, when the pileus becomes dimidiate, as growing from the side of a rotten post; in this situation it is even sometimes imbricated. When dry it is hard and woody. (Grev.)

**II. PLEUROPOUS.**

*Stem simple, excentric (sometimes almost central), or lateral, base of stem black.*

**Polyporus squamosus. Fr.**

Pileus broadly flabelliform, fleshy, pliant, dingy pale yellow or pallid, variegated with large, adpressed, centri-

fugally arranged, brown scales, flesh thick at the base, becoming thin towards the margin; pores short, variable, at first minute, becoming large, angular, and torn, pallid; stem excentric or almost lateral, short, thick, corky, black at the base, reticulated with the rudiments of the decurrent pores; spores elliptical, colourless,  $12 \times 5 \mu$ .

*Polyporus squamosus*, Fries, Syst. Myc. i. p. 343; Greville, Scot. Cr. Fl., t. 207.

On trunks, stumps, &c. Fan-shaped or flabelliform, 6–12 in. across, often larger, sometimes imbricated; pileus often infundibuliform and stem almost central when young, becoming flabelliform as growth proceeds.

Pileus in the very young state scarcely more than the diameter of the stipes, but it rapidly enlarges, and ultimately attains a foot or more in breadth. In its form it is exceedingly irregular, but most commonly it is rather orbicular, at first slightly convex, then plane, and at length concave, the margin somewhat waved, entire, rarely lobed. Colour ochraceous, darker in the centre, surface covered more or less with adpressed (rarely revolute), fimbriated, reddish, blotchy scales. Substance white within, fleshy, rather firm. Pores yellowish-white, very large, irregular, towards the stipe becoming very shallow, often pentagonal or hexagonal, and ending in a mere reticulation. Stipes variable; lateral, sublateral, or, rarely, subcentral, very short and unequally thickened, or much elongated; in the latter state it is frequently branched, in rather a palmate manner, the summit being either quite simple, or the terminating pileus imperfectly developed; this is the *Boletus rangiferinus* of authors. The stipe is always solid, blackish at the base, paler upwards. This species sometimes attains to an enormous size. My esteemed friend, Dr. Hooker, relates an instance given him by Mr. Hopkirk, of one which measured 7 ft. 5 in. in circumference, and weighed, after having been cut four days, 34 lbs. avoirdupois. It was only four weeks in attaining the above size, gaining thus an acquisition of weight of above 1 lb. 3 oz. in the day. (Grev.)

Solitary or imbricated. From a subglobose or turgid scaly blackish knob arise one or more stems, which are at first slightly compressed, flat, and hollowed out above where they are furfuraceous; gradually the depressed surface



expands, but more rapidly in the direction of the light, and the hymenium is formed beneath the small scales of the upper part of the stem, consisting when feebly developed of large angular pores, becoming mere reticulations towards the base. Pileus when fully expanded pallid-ochraceous with scattered brown adpressed scales. If a portion of the hymenium be torn off, a new stratum of pores is rapidly developed. In vaults and hollow trees it sometimes assumes the form of a *Clavaria*, but in this case seldom produces a pileus. (Berk.)

***Polyporus Michelii*. Fr.**

Pileus 2-4 in. across, thin, depressed, repand, pliant, minutely silky and somewhat squamulose, white with a yellowish tinge; stem 1-2 in. long, more or less lateral, usually thickened at the base, rough, white, brownish at the base; pores very short, circular or slightly elongated radiately, entire, large, white; spores almost colourless, elongato-elliptical,  $16-17 \times 7 \mu$ .

*Polyporus Michelii*, Fries, Syst. Myc. i. p. 343; Stev., Brit. Fung., p. 190.

On trunks, stumps, &c., often on willow. Allied to *Polyporus squamosus*, but distinguished by the pores being minute at first, then becoming large, but remaining entire and regular, and by the larger spores.

***Polyporus melanopus*. Fr.**

Pileus 2-3 in. across, pliant, almost plane, then depressed in the centre and more or less infundibuliform, at first minutely flocculose, becoming smooth, whitish then yellowish-brown or tan-colour, flesh thin, white, soft, tubes very short, decurrent, unequal, minute, white; stem excentric,  $1-1\frac{1}{2}$  in. long, 3-4 lines thick, slightly attenuated upwards and diffused into the pileus, often curved, minutely velvety, black; spores almost or quite colourless,  $5 \times 2.5 \mu$ .

*Polyporus melanopus*, Fries, Syst. Myc. i. p. 347; Stev., Brit. Fung., p. 190.

On roots, and apparently on the ground, but attached to wood, chips, &c. Amongst the allied, more or less black-stemmed British species of *Polyporus*, the present is distinguished from *P. squamosus* and *P. Michelii* by the very minute pores that average 4-5 in the space of 1 mm. From

*P. Rostkovii*, *P. picipes*, *P. varius*, and *P. elegans*, the present species varies in the pileus being minutely flocculose at first. In other words, *P. melanopus* is known by the flocculose pileus when young and the minute pores.

**Polyporus Rostkovii. Fr.**

Pilei 4-6 in. across, pliant, several often connate at the base of their stems, infundibuliform, smooth, even, smoke-colour, or sometimes tinged tan-colour; pores short, decurrent, large, angular, edges of dissepiments toothed, white, then dingy and yellowish; stem 3-6 in. long, up to 1 in. thick, excentric, thickened at the base, reticulated by the rudimentary decurrent tubes, abruptly black; spores almost colourless, elongato-elliptical,  $14-16 \times 5-6 \mu$ .

*Polyporus Rostkovii*, Fries, Epicr., p. 439; Stev., Brit. Fung., p. 191.

On trunks of ash, &c., also on stumps. Allied to *P. squamosus*, which it almost equals in size, differs in the usually longer stem, which is reticulated by the decurrent pores on the under side. Several stems usually connate at the base; pileus not scaly. Pores elongato-radiate, 2-4 mm. long.

**Polyporus picipes. Fr.**

Pileus 2-4 in. across, expanded, more or less depressed at the disc or laterally, margin entire or lobed, tough then rigid, even, smooth, yellowish with the disc chestnut, or altogether chestnut, flesh white, 2-3 lines thick, margin thin; stem  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. long,  $\frac{1}{4}$ - $\frac{1}{2}$  in. thick, subequal, firm, varying from almost central, through excentric, to lateral, at first velvety, then naked and dotted, black up to the pores; pores about  $\frac{1}{2}$  mm. across, rounded, short, decurrent, white then pallid or yellowish; spores minute, subglobose  $3.5-4 \mu$ .

*Polyporus picipes*, Fries, Hym. Eur., p. 534; Stev., Brit. Fung., p. 191.

On trunks, especially willow.

Imbricated, smell rather sweet, flesh white. Pileus depressed behind, commonly emarginate, infundibuliform, with lobes all round the margin. Colour pallid, becoming chestnut; commonly livid-yellow with the disc chestnut. (Fries.)

Distinguished from *P. varius* by the even pileus and velvety stem.

**Polyporus varius. Fr.**

Pileus 2-4 in. or more across, expanded, depressed at the point of origin of the stem, pliant, tough, often irregular, smooth, rather virgate, commonly bay brown, sometimes paler, flesh 2-3 lines thick, pallid; stem excentric or lateral,  $\frac{3}{4}$ -1 $\frac{1}{4}$  in. long, about 2-3 lines thick, even, smooth, greyish-black downwards; pores decurrent, short, more or less rounded, about  $\frac{1}{4}$  mm. across, whitish then pale cinnamon; spores colourless, linear-oblong,  $4 \times 1.5 \mu$ .

*Polyporus varius*, Fries, Syst. Myc. i. p. 352; Stev., Fung., p. 191.

On trunks, stumps, &c., especially ash. Size and form variable, when large the pileus is often undulated and lobed; often in dense tufts and more or less deformed from mutual pressure; commonly bay, but sometimes pale, especially when young. Sometimes sessile. Distinguished from *Polyporus picipes* by the glabrous stem (not velvety), the more or less virgate or radially streaked pileus, and the different spores. The pileus soon becomes woody and rigid.

**Polyporus elegans. Fr.**

Pileus 2-4 in. across, expanded, often angular, equally fleshy, at first pliant, soon rigid and woody, smooth, even, all of one colour, varying from pale ochraceous to dull orange, shining, not virgate nor infundibuliform; stem  $\frac{1}{2}$ -1 $\frac{1}{4}$  in. long, 2-3 lines thick, excentric or lateral, even, smooth, pallid above, abruptly black below, rooting; pores plane, sometimes decurrent to the black portion of the stem, sometimes not at all decurrent, subrotund, minute, yellowish-white, then pallid, about  $\frac{1}{4}$  mm. across; spores linear-elliptical,  $4 \times 1.5 \mu$ .

*Polyporus elegans*, Fries, Epicr., p. 440; Stev., Fung. ii. p. 192.

On stumps and trunks, chiefly birch. Distinguished from allied black-stemmed species, by the pileus being almost plane, scarcely depressed, neither virgate nor infundibuliform, and in the absence of any bay or chestnut colour. Flesh white, about 1 $\frac{1}{2}$ -2 lines thick, equally so up to the margin.

**Var. nummularius. Fries.**

about 1 line long, sometimes less, whitish, angular, irregular, torn,  $\frac{1}{3}$ – $\frac{2}{3}$  mm. across; spores colourless, subglobose,  $5 \times 4 \mu$ .

*Polyporus cristatus*, Fries, Syst. Myc. i. p. 356; Stev., Brit. Fung., p. 194.

Very variable in form, stem white, usually thick, up to 1 in., irregular and more or less branched, and bearing several more or less depressed pilei; sometimes, however, only one is present. Known amongst the branched fragile species furnished with a stem by the greenish colour of the pileus.

Substance that of *Polyporus giganteus*. Colour resembling *P. sulphureus*. Stem lateral, irregular, pruinose, white, at length brown. Pilei rather fleshy, involute, and more or less growing into each other, villosopulverulent, 2–3 in. broad, greenish-yellow. Pores unequal, white, becoming more or less tinged with green when torn. (Fries.)

#### *Polyporus giganteus*. Fr.

Formed of numerous imbricated pilei, fleshy and tough, then coriaceous, pilei dimidiate, very broad, flaccid, slightly zoned, rivulose, depressed behind, bay-brown; stem much branched, originating from a tuberous base; pores minute, roundish, at length torn, pallid, becoming darker when bruised.

*Polyporus giganteus*, Fries, Syst. Myc. i. p. 356; Cke., Hdbk., p. 268, fig. 65.

At the base of trunks, &c.

Forming large tufts 1–2 ft. or more broad, branched in an imbricated manner. (Berk.)

Pilei sublateral, flaccid, various in form, the surface granulated with minute brown flocci, rigid, when dry squamosofibrillose; at first pale, then brownish-yellow; disc depressed, at length black. Pores minute, dirty brown when bruised, at length torn. I have seen tufts of this species in Sweden 4 ft. across. (Fries.)

#### *Polyporus acanthoides*. Fr.

Imbricated; pliant when growing, then coriaceous; pileoli infundibuliform, thin, margin lobed, 2–5 in. across, flesh 2–3 lines thick, ferruginous or pale chestnut, indistinctly zoned, radiately rugulose, smooth; stems connate-branched,

attenuated downwards, white, then rufescent; pores very shallow, irregularly sinuous, dissepiments toothed at the edge, more or less decurrent, whitish, then rufescent; spores subglobose,  $4 \times 3 \mu$ , almost colourless.

*Polyporus acanthoides*, Fries, Epicr., p. 448; Stev., Brit. Fung., p. 195.

*Boletus acanthoides*, Bull., t. 486.

On trunks, also on roots and buried wood. Pores irregular,  $\frac{1}{4}$ –1 mm. in length. Forming large clusters, said by Bulliard to sometimes extend for 2–3 ft. Somewhat resembling *Polyphorus giganteus*, but thinner and pale when young, rigid and fragile when old. *P. rufescens* is distinguished by the spongy substance and hairy pileus.

#### *Polyporus sulphureus*. Fr.

Horizontal, attached by a broad base, usually very much imbricated; pileus undulate, almost glabrous, pale flesh-colour with a yellow tinge, flesh thick, yellow, then white, of a cheesy consistency; pores up to  $\frac{1}{2}$  in. long, minute, plane, sulphur-yellow; spores elliptical, hyaline, slightly papillose,  $7-8 \times 4-5 \mu$ .

*Polyphorus sulphureus*, Fr., Syst. Myc. i. p. 357; Berk., Outl., t. 16, f. 3.

On trunks. Commonly sessile, but sometimes stipitate forms occur, tufted and imbricate, pilei 6–12 in. across, sometimes much larger. Flesh yellow, becoming white, of a cheese-like consistency, not becoming hard. Whole fungus brittle and with a disagreeable smell. Dry specimens are often more or less incrustated with a deposit of crystals of binoxalate of potash.

Plant very polymorphous in its shape, and unequal in size, composed of a number of mostly imbricated pilei, more or less grown together, so as to form one mass, from which the rounded and lobed margins of the pilei project in a tiled manner, or shoot out into various excrescences, or even somewhat cylindrical, simple or divided branches; the whole sometimes attaining two or three feet in breadth. Colour yellowish, orange, red, or a bright union of these hues, fading in age, the pores always of a fine sulphur tint. Flesh thick, white. Pores very numerous, minute, roundish, readily produced on any part of the fungus, according to

situation and position. Substance light, spongy; when old, dry and friable, never coriaceous. In the young state whitish, soft, and presenting nothing but a plane, convex, and somewhat effused surface. (Grev.)

**Polyporus Herbergii.** B. & Br.

Caespitose, 4-8 in. across, rather soft and corky; pilei imbricated, bright rusty-bay, becoming sulphur-yellow towards the margin; tubes 2-4 lines long, pores labyrinthiform, unequal, pale grey, dissepiments torn.

*Polyporus Herbergii*, Berk. and Broome, Ann. Nat. Hist., n. 1805; Stev., Brit. Fung., p. 195.

*Polyporus spongia*, Fr., Hym. Eur., p. 542.

*Boletus Herbergii*, Rostkovius, in Sturm's Deutschl. Cr. Fl., pt. 29, t. 18.

On trunks.

Minutely velvety, becoming almost glabrous, soft and felt-like to the touch, bright rusty-brown, often bright yellow at the margin. Considered by Cooke as a variety of *Polyporus cuticularis*.

**Polyporus alligatus.** Fr.

Usually in many tufted or overlapping layers, pilei variable in size and form, 1-3 in. across, rather fleshy, flesh rather fibrous, rigid, fragile; pilei pale dingy tan-colour, not zoned, imbricated, unequal, minutely velvety or villous; pores short, small, soft, white, often sterile, and filled with delicate hyphae; spores elliptical, pale,  $6 \times 7 \mu$ .

*Polyporus alligatus*, Fries, Elench., p. 78; Stev., Brit. Fung., p. 195.

On roots, &c., often involving grass, twigs, &c., during its growth; pores about  $\frac{1}{2}$  mm. across.

Exceedingly variable in form, irregularly club-shaped or variously expanded, but without a distinct stem. Lobes often imbricated, unequal, dilated, often circular in outline, undulated, silky-villose, dirty pale tan-colour, flesh rigid, fibrous, paler.

**Polyporus heteroclitus.** Fr.

Tufted, coriaceous, pilei springing from every side of a hard tubercular base, lobed, villous, thin, zoneless, yellowish,

then brownish-orange; pores irregular and elongated, yellow, then brownish.

*Polyporus heteroclitus*, Fries, Syst. Myc. i. 344; Berk., Eng. Flora, vol. v. p. 135; Cke., Hdbk., p. 269.

*Boletus heteroclitus*, Bolton, t. 164.

On the ground, growing from stumps, partly covered with soil.

Pileus  $2\frac{1}{2}$  in. broad; it shoots out several flat pieces from a hard and coriaceous root, which is white within, lying on the surface of the earth in a horizontal direction. Pores very variable in size and form. (Purton, MS.)

#### *Polyporus salignus*. Fr.

Tufted, coriaceous, soft, elastic, pilei dimidiate, imbricated, flattened and more or less reniform, whitish, covered with adpressed down, grooved near the tumid, more or less lobed margin; pores crowded, thin, elongated, intricately waved, white.

*Polyporus salignus*, Fries, Epicr., p. 452; Hym. Eur., p. 544; Cke., Hdbk., p. 269.

On decaying willows.

Pilei imbricated, white, 2-4 in. across, rather thick. In-odorous.

#### *Polyporus spongia*. Fr.

Caespitose, much divided; pilei 3-6 in. across, spongy, soft, very numerous, dimidiate, connate in large, dense tufts, becoming almost plane, wrinkled and rugulose, strigoso-velvety, ferruginous-brown, when dry almost orange-brown, flesh about  $\frac{1}{2}$  in. thick, margin thin, soft, fibrous, bright brown; pores short, about  $\frac{1}{4}$  in., rather small, entire, sulphur-coloured, then brownish; spores elliptical, very pale yellow, almost colourless,  $7 \times 4 \mu$ .

*Polyporus spongia*, Fries, Monogr. ii. p. 268; Fries, Hym. Eur., p. 542; Fries, Icones, t. 180, f. 2.

On dead trunks of pine, &c. Allied to *Polyporus Schweinitzii*, but distinguished by the usually densely tufted habit, brighter colour, and shorter, small, entire pores, which average about  $\frac{2}{3}$  mm. across. A yellow-brown colouring-matter present in every part is soluble in an alkaline solution or in methylated spirit.

## IV. APUS.

*Pileus sessile, dimidiate or effuso-reflexed.*

\* *Pileus ferruginous, brownish, or dark fuliginous.*

**Polyporus dryadeus. Fr.**

Pileus 3-10 in. or more broad, 2-3 in. thick, horizontal, pulvinate, fleshy then corky, cuticle thin, soft, smooth, rugged becoming even, ferruginous then brown; flesh ferruginous, somewhat zoned, rather velvety-fibrous when cut; tubes  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long, thin, round, soft, ferruginous, openings rounded, paler, about  $\frac{1}{3}$  mm. across, dissepiments entire; spores colourless, elliptical,  $5 \times 3 \mu$ .

*Polyporus dryadeus*, Fries, Syst. Myc. i. p. 374 (in part); Fries, Hym. Eur., p. 553; Stev., Brit. Fung., p. 202.

On oak trunks.

Smell strong, subacid. Growing rapidly and attaining a large size. Annual, but persisting through the winter. Exuding drops of water at the margin like *P. applanatus*, from which, however, it is quite distinct. Odour slightly acid. Everywhere imbricated, 5 in. broad, 1 in. thick, with indistinct ferruginous zones; pores short, slightly larger than in *Polyporus fomentarius*, ferruginous within. Margin sometimes exuding drops of water. (Fries.)

**Polyporus hispidus. Fr.**

Pileus laterally attached, horizontal, 4-8 in. broad, dimidiate, more or less convex, compact, fleshy, ferruginous-brown, hispid; flesh spongy, 1-2 in. thick, ferruginous, composed of diverging fibres; pores  $\frac{1}{2}$ -1 in. long or more, yellowish then brownish, but paler than the pileus, minute, margin fimbriated, often inclined to separate; spores elliptic-oblong, obliquely apiculate, bright orange-brown,  $10 \times 7 \mu$ .

*Polyporus hispidus*, Fries, Syst. Myc. i. p. 362; Stev., Brit. Fung., p. 201.

On living ash trunks, &c. Variable in size and colour, subferruginous, when old often blackish-brown, rather soft and spongy. Pores  $\frac{2}{3}$ -1 mm. across. When any part of the fungus is treated with ammoniac or potassic hydrate, it yields a deep yellow-brown colouring-matter. Distinguished



from *Polyporus cuticularis*, its nearest ally, by the thicker flesh, larger pores, and larger obliquely apiculate spores, also by the presence of a brown colouring-matter soluble in alkaline solutions, which is not the case with *Polyporus cuticularis*.

Pileus a foot or more across, 4 in. thick, dimidiate, with occasionally an obsolete knob-like stem, generally very hispid, but sometimes almost smooth and cracked; substance fleshy but fibrous, marked with concentric lines which seem to indicate different intervals in which vegetation has been more or less dormant, brown, blackish, yellowish or reddish-brown; below pale yellow, or rich sienna-brown, with the margin paler. Sporules pure yellow, often hanging upon spider's threads in elegant festoons beneath the hymenium. Close to the bark of the tree the pubescence often resembles *Ozonium auricomum*. (Berk.)

Substance spongy, moist, coloured. Pileus 4-6 in., yellowish or brown; pores subrotund, equal, minute, forming long tubes. (Fries.)

Pileus dimidiate, horizontal, very thick, 5-18 in. across, roundish, often irregularly divided into two or three large lobes, convex, very villose, even shaggy, ferruginous at first, and somewhat orange at the margin, at length black in age. Flesh yellow-ferruginous, zoned, difficult to cut, but tearing easily in the direction of the fibres. Pores long, yellowish, roundish, pale and fringed at their orifices, sporules bright yellow. (Grev.)

#### ***Polyporus cuticularis*. Fr.**

More or less semicircular, horizontal, base of attachment rather narrowed, hairy or rather velvety-tomentose, often minutely uneven and with a tendency to form small radiating wrinkles, becoming plane, ferruginous-brown, then darker; flesh  $\frac{1}{4}$ - $\frac{1}{2}$  in. thick, spongy, formed of lax parallel fibres, yellow-brown; margin fibroso-fimbriate, incurved; pores longer than thickness of flesh, pale then ferruginous, minute; spores broadly elliptical, not apiculate, yellow-brown,  $7 \times 4-5 \mu$ .

*Polyporus cuticularis*, Fries, Syst. Myc. i. p. 363 (excl. syn. *P. alneus*); Stev., Brit. Fung., p. 202.

On trunks, Pileus 3-5 in. across, thin, becoming

plane; allied to *Polyporus hispidus*, but softer, &c.; for fuller distinctions see under the latter.

Imbricated, pilei growing into each other, obsoletely zoned, rather triquetrous; varies "substipitate" and resupinate; tomentum strigose or velvety, at length disappearing. Pores small, subrotund, greyish pruinose, shining when looked at with the light falling on them, at length naked, torn, substance fibrous, hard, but not persistent when dead. (Fries.)

***Polyporus quercinus*. Fr.**

Pileus tongue-shaped, horizontal, narrowed behind into a thick stem, 3-6 in. long, 2-3 in. broad, up to 1 in. thick, convexo-plane, floccoso-granular, pale tan or tinged red, and becoming reddish when bruised; substance coloured, corky, texture floccose, soft then hardened; tubes about 2 lines long, pores rounded,  $\frac{1}{3}$ - $\frac{1}{2}$  mm. across, whitish; spores colourless, narrowly elliptical  $5 \times 2 \mu$ .

*Polyporus quercinus*, Fr., *Epier.*, p. 441; *Stev.*, *Brit. Fung.*, p. 203.

On dead oak trunks. Somewhat resembling, in form and general appearance, *Fistulina hepatica*, from which, however, it is generically distinct.

***Polyporus Keithii*. B. & Br.**

Shell-shaped, effuso-reflexed, narrowed behind, about  $\frac{1}{2}$  in. across; pileus reddish-brown, rough with rigid spine-like points; pores large, angular, pallid, dissepiments torn; spores colourless, elliptical,  $6 \times 3 \mu$ .

*Polyporus Keithii*, B. & Br., *Ann. Nat. Hist.*, n. 1430; *Stev.*, *Brit. Fung.*, p. 201.

On fallen sticks. The pores average about  $\frac{2}{3}$  mm. in diameter.

***Polyporus crispus*. Fr.**

Horizontal, effused behind, thin, pliant, then coriaceous, tough, floccoso-rugulose, when young smoky-black, zoneless, the thin crisped or wavy margin whitish; when full grown the pileus becomes pallid or greyish, and the margin blackish; pores about 1 line long, rather large, unequal, at length torn, silvery grey; spores elliptic-oblong, colourless,  $5-6 \times 3 \mu$ .

*Polyporus crispus*, Fries, Syst. Myc. i. p. 550; Stev., Brit. Fung., p. 200.

On old stumps, &c. Distinguished at once from allied species by the coarsely fibrillose radiately rugulose pileus; pores average about three in the space of 1 mm., but very often collapsing and becoming much torn and *Daedalea*-like.

Imbricated, thin, sometimes resupinate, obsoletely zoned. Pores much larger than in *Polyporus adustus*, acute, unequal, colour smoky, margin blackish. (Fries.)

***Polyporus nidulans*. Fr.**

Pileus fleshy, very soft, subpulvinate, convex above and below, villous then smooth, zoneless, yellowish-red, similarly coloured inside; tubes elongated, pores rather large, unequal, angular, tawny, with a tinge of brick-red.

*Polyporus nidulans*, Fries, Syst. Myc. i. p. 364; Cooke, Hdbk., p. 270.

On trunks and fallen branches.

Fragrant when dry, remarkable for its soft substance. Pores larger than in neighbouring species (*P. rutilans*, *P. gilvus*, &c.), margin spreading, rather obtuse. There are two forms, one gilvous, the other inclining to flesh-colour. (Fries.)

Fragrant when dry; colour of the pileus rufescent or yellowish; margin spreading, somewhat obtuse. (Cooke.)

Colour variable, generally pale ochraceous, but also reddish, rusty-fulvous, &c. Substance very soft, elastic, coloured like the pileus. Pileus usually elongated, of variable size (also resupinate),  $\frac{1}{2}$ –1 in. thick. Pores deep, round, oblong-quadrangular or flexuous. (Fries.)

***Polyporus mollis*. Fr.**

Pileus 1–5 in. long,  $\frac{1}{2}$ –1 in. broad, brownish flesh-colour, fleshy-fibrous, soft, effuso-reflexed, rugose, margin acute; flesh up to  $\frac{1}{4}$  in. thick, white; tubes 2–3 lines long, pores unequal, soft, white, elongated and wavy, becoming reddish when touched.

*Polyporus mollis*, Fries, Syst. Myc. i. p. 360; Stev., Brit. Fung., p. 198.

On dead pine wood. Pores up to 1 mm. in length. Not watery, but soft to the touch. Several specimens often

becoming connate, often considerably elongated, upper edge free, or entirely resupinate. Known by the white pores becoming foxy when bruised.

Flesh fibrous, soft. Triquetrous, rather moist, base effused, margin acute; sometimes imbricated. Pores thin, narrow, some round, others elongated and flexuous, toothed, pale flesh-colour. (Fries.)

**Polyporus rutilans. Fr.**

Pileus fleshy, tough, thin soft, at first villous then almost smooth, zoneless, tawny-cinnamon becoming paler, inside similarly coloured; tubes short, pores minute, thin, equal, acute, cinnamon.

*Polyporus rutilans*, Fries, Syst. Myc. i., p. 363; Cooke, Hdbk., p. 270.

On fallen branches.

Variable in form, but thin, not pulvinate and convex above and below, as in *Polyporus nidulans*. Pileus at length dry, friable, the extreme margin inflexed, but not incurved and fimbriate, as in *Polyporus cuticularis*. Pores rather shining. (Fries.)

When fresh very soft, of a beautiful reddish-grey, and with a powerful but pleasant odour, like that of aniseed. (Berk. & Broome.)

Perhaps a variety of *Polyporus nidulans*. Pileus soft, rather fragile, convex, base rather effused, margin obtuse, unequal. Pores shining-white when young, soon changing to the colour of the pileus, medium-sized, sometimes flexuous. (Fries.)

**Polyporus destructor. Fr.**

From 2-6 in. long, effuso-reflexed, fragile, rugose, rather undulated, brownish-white, substance fleshy, watery, zoned; tubes 4-7 mm. long, pores white, subrotund, dissepiments becoming torn into teeth.

*Polyporus destructor*, Fries, Syst. Myc. i. p. 359; Stev., Brit. Fung., p. 199.

On wood, especially that has been worked, which is softened and destroyed as by *Merulius lacrymans*. Pores  $\frac{1}{4}$ - $\frac{1}{2}$  mm. diameter, much crowded, forming, with the exception of the uniting membrane, the whole of the fungus. Sometimes almost resupinate.

*Var. undulatus.* Fr., broadly expanded, marginate, pale bay-brown.

**\*\* *Pileus white, pale ochraceous, yellowish, &c.***

***Polyporus betulinus.* Fr.**

Pileus thick, corky, elastic, hoof-shaped, obliquely umbonate behind, and forming the point of attachment, margin obtuse, incurved, sterile below, pileus covered with a thin crust that eventually breaks away, whitish, zoneless, glabrous; pores up to  $\frac{1}{4}$  in. deep, minute, unequal, whitish; spores white.

*Polyporus betulinus*, Fries, Syst. Myc. i. p. 358; Greville, Scot. Cr. Fl., t. 246.

On trunks of birch, &c. Distinguished by the white, corky, very fleshy pileus having the margin incurved, 3-8 in. across, flesh white, soft, very thick behind, horizontally attached by the posterior, oblique umbo. Pores very minute, about 1 mm.

Pileus 4-6 in. across, smooth, pale reddish-brown when mature, often mottled, roundish or sometimes reniform. Flesh white, very thick; pores white or tinged with brown, narrow, the orifices toothed, separable from the pileus when fresh, but really concrete with it. (Grev.)

Taste and smell acid. The epidermis is very thin and delicate, and easily peels off; when dry the whole plant is very light; its texture between coriaceous and corky. (Berk.)

***Polyporus borealis.* Fr.**

Horizontal, subspathulate or reniform, either attenuated behind into a short, more or less distinct stem, or thick and sessile, 2-3 in. across, whitish then dingy yellow, spongy then corky, compact, hairy, flesh thick, composed of parallel fibres, whitish; tubes 2-3 lines long, pores unequal, flexuous, dissepiments thin, torn, white; spores colourless, subglobose,  $4\ \mu$  diameter.

*Polyporus borealis*, Fries, Syst. Myc. i. p. 366; Stev., Brit. Fung., p. 202.

On stumps and trunks of pine, &c. Pileus often radiato-rugose, rigid and more or less incurved when dry. When a stem is present the tubes are more or less decurrent.

Very distinct from its nearest allies. Fleshy when young, but becoming corky with age. Its other respects variable. The following forms occur:—

*B. montanus*. Pileus fleshy, thick, hairy, margin obtuse; pores obtuse, entire. *C. spathulatus*, pileus thin, villose, margin acute, extended into a short lateral stem, dissepiments thin, much torn.

Inodorous when fresh, but with a slight anise odour when dry. Imbricated, pilei more or less growing into each other, 2 in. and more broad and thick, convex above, sometimes velvety, at others strigose, margin acute, plane below. Pores white, torn, sinuous and subrotund, very narrow, forming long tubes. (Fries.)

***Polyporus fumosus*. Fr. (figs. 14, 15, p. 184.)**

Horizontal, often imbricated, effused behind, 2–5 in. long, pallid with a smoky tinge, silky becoming smooth, zoneless; flesh whitish, fibrous, rather corky, with indications of zones; pores shallow, roundish, small, whitish with smoky tinge, darker when bruised, dissepiments entire; spores colourless, subpyriform or elliptical,  $5 \times 2.5 \mu$ .

*Polyporus fumosus*, Fries, Syst. Myc. i. p. 367; Stev., Brit. Fung., p. 200.

On old stumps, trunks, &c. Imbricated and effused behind, flesh rather thick, up to  $\frac{1}{2}$  in., becoming thinner towards the margin; pores average about three in the space of 1 mm. Distinguished from *P. adustus* by the thicker substance, and in the pores not becoming black in drying.

Tufted, imbricato-connate, whitish, tinged with smoky-grey; substance with indications of zones, smell not appreciable. Pileus rather thick, 2–4 in. broad, surface glabrous or silky. Pores equal.  $\beta$ ., small, pileus livid-grey, pores white;  $\epsilon$ ., thin, pileus dingy brick-red, broad margin, and pores white. (Fries.)

***Polyporus adustus*. Fr.**

Effuso-reflexed and imbricate, or entirely resupinate, thin, flaccid; pileus pallid-greyish, villose, obsoletely zoned, rugulose; pores very short, minute, round, whitish-pruinose, soon dingy-grey, blackish when dry; spores colourless,  $4.5 \times 2.5 \mu$ .

*Polyporus adustus*, Fries, Syst. Myc. i. p. 363; Berk., Outlines Fungol., p. 243.

On trunks, stumps, &c. Very variable, sometimes entirely resupinate, at others with a broad, free, reflexed margin, and often much imbricated. Whole substance not more than 2-3 lines thick, flexible when moist. Known by the ashy-grey hymenium, pores minute, obsolete towards the margin, averaging 3-4 in the space of 1 mm.

Pores very small and grey, even in younger specimens always leaving a whitish margin on the under side which will readily distinguish it. (Sow.)

Sowerby's original specimens are now of a dull reddish-brown, with the tubes darker and not extending to the margin; their substance hard and corky; they have scarcely any of the scorched appearance which is very remarkable in the specimens from Nottinghamshire. (Berk.)

Imbricated, size variable, subrugose, obsoletely zoned, covered with a delicate tomentum. Pores short, rotund, obtuse, equal, at first with a silvery sheen, then dingy grey or blackish. (Fries.)

***Polyporus amorphus*. Fr.**

Effuso-reflexed or entirely resupinate, thin and flexible, becoming incurved and rigid when dry, pileus white, minutely velvety; pores small, irregular, golden yellow, dissepiments very thin; spores colourless, elliptic-piriform,  $8-9 \times 4 \mu$ .

*Polyporus amorphus*, Fries, Obs. 2, p. 258; Stev., Brit. Fung., p. 201.

On rotten pine wood, or running over pine leaves on the ground. Sometimes very thin and entirely resupinate, following the inequalities of the matrix; pores about three in space of 1 mm., but irregular and sometimes when growing on a vertical substratum becoming effuso-reflexed and imbricated, and in such specimens the pores are often large, irregular, and torn.

Resupinate, with the upper margin reflexed or dimidiate, imbricated, somewhat zoned, white and silky; pores minute, short, yellowish, or rich tawny, pruinose when young. (Berk.)

Pilei imbricated, soft, slightly zoned, becoming darker

behind. Pores short, equal, obtuse, bright yellow, covered with white powder when young. (Fries.)

**Polyporus epileucus.** Fr.

Pileus horizontal, pulvinate, 3-5 in. broad, 1-2½ in. thick, soft and of a cheesy texture, then firm, whitish, rugged with villose projections, flesh whitish; tubes 2-3 lines long, pores minute, round, pale ochraceous-tan colour, ¼ mm diameter.

*Polyporus epileucus*, Fr., *Epicr.*, p. 452; *Stev.*, *Brit. Fung.*, p. 196.

On trunks and stumps.

Simple, large, semiorbicular, concave below, flesh not fibrous, scarcely zoned, pores at first scarcely distinguishable, tubes minute, up to 18 mm. long. (Fries.)

**Polyporus alutaceus.** Fr.

Pileus 1-2 in. across, ¾ in. thick, horizontal, reniform, fleshy, becoming tough, pileus minutely velvety, pale dingy ochraceous, flesh similar in colour, soft, fibrous, vaguely zoned, margin acute; tubes 3-4 mm. long, pores roundish, minute, about ½ mm. across; spores subglobose, with a slight ochraceous tinge, 4 µ diameter.

*Polyporus alutaceus*, Fries, *Syst. Myc. i.* p. 36.; *Stev.*, *Brit. Fung.*, p. 197.

On beech and pine trunks, stumps, &c. Substance obsoletely zoned, soft, fragile. Pilei often connate, triquetrous, reniform, obtuse, 1 in. broad and thick. Pores quite entire, forming long tubes.

Somewhat imbricated, sometimes convex, at others flattened, occasionally hairy and rugose, plane beneath. (Fries.)

Tubes about ¾ in. long. (Stev.)

**Polyporus chioneus.** Fr.

Pileus 1-2 in. across, thick and fleshy, soft, becoming even, smooth, zoneless, often extended behind, also imbricated, every part white; tubes short, pores minute, round, equal, the dissepiments quite entire.

*Polyporus chioneus*, Fries, *Syst. Myc. i.* p. 359; *Stev.*, *Brit. Fung.*, p. 197.

On trunks and stumps of pine, birch, &c. Soft when growing, becoming rigid when dry, hyaline-white when



moist, shining-white when dry. Smell rather acid. Without a distinct cuticle. Pores about  $\frac{1}{2}$  mm. across. Distinguished amongst the soft white species of *Polyporus* by the absence of blue or rusty stains when bruised.

Allied to *Polyporus spumeus*. Flesh soft, watery, slightly acid, taste astringent. Pileus rather thin, 1 in. and more across, zoneless, (pubescent when young?), margin thin, acute, sometimes with a short lateral stem. Pores round, at length convex. White, watery-white when moist. (Fries.)

***Polyporus cerebrinus*. B. & Br.**

Resupinate, pulvinate, about 1 in. across,  $\frac{1}{4}$  in. or more thick; snow-white, very minutely tomentose, margin crenulate; pores rounded, rather large, dissepiments thick, entire; spores subfusiform, colourless,  $5 \times 2.5 \mu$ .

*Polyporus cerebrinus*, B. & Br., Ann. Nat. Hist., n. 1800; Stev., Brit. Fung., p. 197.

On fir. Looks like a portion of white brain; pores average about  $\frac{1}{2}$  mm. across.

***Polyporus caesius*. Fr.**

Resupinate or dimidiate, 1-3 in. across, fleshy, irregular, soft and tough, silky, white, here and there tinged with blue; pores minute, unequal, elongated, flexuous, dissepiments thin, torn into irregular teeth; spores elliptical,  $14 \times 3 \mu$ .

*Polyporus caesius*, Fries, Syst. Myc. i. p. 360; Stev., Brit. Fung., p. 198.

On dead trunks, especially pine.

A small species  $\frac{1}{2}$ -3 in. broad, imbricated and lacinated, sometimes stipitate, very delicate, changing when touched to bluish; flesh thin; pores of various lengths, sometimes oblique, and deeper than the flesh of the pileus. (Berk.)

Pores  $\frac{1}{4}$ - $\frac{1}{2}$  mm. diameter.

Pileus  $\frac{1}{2}$ -3 in. broad, reflexed, sometimes imbricated, white at first, at length glaucous or bluish, soft and easily injured, but when old rather tough, and at length dry and hard. Pores small, white, irregular, often oblique, lacerating, of various lengths. Flesh tender, and turning bluish when injured, as does also the surface of the pileus. (Grev.)

Flesh thin, soft; pileus  $\frac{1}{2}$ –2 in. broad, grey or bluish, form variable, sometimes effuso-reflexed, at others triangular, sometimes "stipitate." Pores plane, minute, torn as in *Sistotrema*. (Fries.)

**Polyporus spumeus. Fr.**

Whitish, 3–4 in. across, pileus fleshy, spongy, compact, pulvinate, gibbous, rugosely hispid, margin incurved, base stem-like; flesh zoned towards the margin; pores minute, rounded, dissepiments acute, entire.

*Polyporus spumeus*, Syst. Myc. i. p. 358; Cke., Hdbk., p. 273.

On living or dead trunks. Pores about  $\frac{1}{2}$  mm. across.

Plant 3–4 in. across, oozing out from the tree in a very soft mass, which hardens in a day, and if it dries favourably the pileus becomes hispid. (Berk.)

Large, 3 in. across, thick, soft when young, then firmer. Pores of medium size, equal, entire, not deep. On trunks of beech and birch. (Fries.)

**Polyporus lacteus. Fr.**

White. Pileus fibrous, fleshy, fragile, triangular, pubescent, zoneless without and within, the inflexed margin acute; pores medium-sized, becoming labyrinthiform; dissepiments thin, acute, torn.

*Polyporus lacteus*, Fries, Syst. Myc. i. p. 359; Stev., Brit. Fung., p. 197.

On dead laburnum, birch, beech, &c. Without a cuticle, small, triangular, soft, taste astringent. Pores plane, flexuous, but very fine and deep, torn into shreds as in *Sistotrema*. Flesh thinner than the length of the tubes.

Commonly small, thin, but sometimes larger, transversely elongated, very much sloped downwards and gibbous behind, at length becoming smooth and uneven.

Inodorous, small, triquetrous, soft, taste astringent. Pores plane, flexuous, becoming torn into *Sistotrema*-like teeth. Flesh thinner than length of pores. (Fries.)

**Polyporus pallescens. Fr.**

Pileus fleshy then corky, thin, even, glabrous, zoneless, yellowish, the acute margin similarly coloured; tubes short, pores minute, rounded, white then yellowish.

*Polyporus pallescens*, Fries, Syst. Myc. i. p. 359; Oke., Hdbk., p. 274.

On stumps, trunks, branches, &c.

Subcaespitose, commonly small and thin, affinities uncertain. (Fries.)

Thin, imbricated, 2-3 in. or more broad, with scarcely any trace of zones, more or less tuberculated, pores minute, many superficial, but towards the base a line or more deep, with a pulverulent appearance, arising from a very minute down. (Berk.)

*Polyporus trabeus*. Rostk.

White; pileus fleshy, fibrous, then firm, effuso-reflexed, transversely elongated, zoneless, pallid; tubes short, minute, subrotund or elongated, toothed, white.

*Polyporus trabeus*, Rostkovius, in Sturm's Deutschl. Fl. Cr., t. 28; Fries, Hym. Eur., p. 547.

On pine wood. Commonly confounded with *Polyporus destructor*; both very effused and reflexed, glabrous and pubescent, but the present species is more regular, clearer in colour, hyaline within when moist, and obsoletely zoned. (Fries.)

*Polyporus fragilis*. Fr.

Whitish, becoming spotted with brown when touched; pileus fleshy, reniform, plano-depressed or variable in form, fibroso-rugose, convex below; pores slender, elongated and wavy, intricate,

*Polyporus fragilis*, Fries, Elenchus, p. 86; Oke., Hdbk., p. 270.

On decayed fir wood, &c. Form very variable, sometimes extended behind into a narrowed stem-like base and more or less pendulous.

*Polyporus fibula*. Fr.

Whitish; pileus coriaceous, soft, tough, velvety-hairy, zoneless, often radiato-rugose, snow-white within, margin entire, acute; pores small, roundish, acute, at length torn, becoming yellowish.

*Polyporus fibula*, Fries, Epicr., p. 475; Stev., Brit. Fung., p. 210.

On fallen oak branches, also on worked wood, &c.

Small, adnate behind, margin free all round, sometimes

forming orbicular shields, variable in form from growing into each other. (Fries.)

**Polyporus adiposus.** B. & Br.

Effuso-reflexed or entirely resupinate, soft; pileus white, usually tinged here and there with brown, minutely tomentose; hymenophore rather fleshy; pores whitish, tinged in places with brown, pores small, irregularly angular, very shallow in resupinate forms, in the reflexed forms often elongated and irregularly torn.

*Polyporus adiposus*, Berk. & Broome, Ann. Nat. Hist., n. 711; Stev., Brit. Fung., p. 201.

On the ground near stumps and on trunks. Often irregularly effused for several inches, with here and there shortly reflexed portions, white with rusty stains here and there. Pores where tolerably normal, about four in 1 mm., rather fleshy and soft. The whole fungus turns brown on drying.

**Polyporus armeniacus.** Berk.

Broadly effused, thin, flesh almost obsolete, margin downy; pores shallow, rounded, rather irregular, dissepiments thick, pure white, changing to deep cinnamon during drying; spores colourless, elliptical,  $7 \times 4.5 \mu$ .

*Polyporus armeniacus*, Berk., Engl. Flor., vol. v. p. 147; Stev., Brit. Fung., p. 215.

Broadly effused and usually consisting in the large patches of several confluent individuals. Margin often sterile and byssoid. Pores average about  $\frac{1}{2}$  mm. in diameter. Cooke considers that the present species is not distinct from *Polyporus amorphus*, but the shape and size of the spores are against this idea.

FISTULINA. Bull.

Hymenium formed on the under surface of a fleshy hymenophore, at first warted, the warts developing into cylindrical tubes that remain distinct and free from each other, and producing the tetrasporous basidia in their interior. Conidia produced in cavities of the old hymenophore.

*Fistulina*, Bull., Champ. i. p. 314; Stev., Brit. Fung., p. 183.

Superficially resembling a fleshy *Polyporus*, but distinguished by the tubes of the hymenium remaining free from each other.

***Fistulina hepatica*.** Fr. (figs. 8-10, p. 184.)

Pileus roundish, dimidiate, or subspathulate, attached by a broad base or substipitate, blood-red, fleshy and soft, streaked internally; tubes at first pallid, then red; spores broadly elliptical, salmon-colour,  $5-6 \times 3-4 \mu$ . Conidia  $6-10 \times 5 \mu$ , salmon-colour.

*Fistulina hepatica*, Fries, Syst. Myc. i. p. 396; Stev., Brit. Fung., p. 183, fig. lxii.

On the trunks of living trees, oak, hornbeam, beech, &c. Size variable, from 3-20 in. across, 2-3 in. thick, sometimes several pilei spring from the same point, red above and inside streaked like beetroot. Popularly known as the beef-steak fungus.

Pileus 4-8 in. broad, exceedingly variable in form, being either quite sessile or obliquely stipitate, entire or lobed, solitary, or several growing together in a tufted manner, but rarely at all imbricated. The substance is very thick, soft, fleshy, viscid or juicy, especially in a young state, when a blood-like fluid is emitted if it be wounded; the fibres composing the substance are tenacious; and in tearing the pileus they are found to pass from the base to the extremity. When the pileus is divided longitudinally by a knife, it is beautifully marbled with red and white, somewhat like fine beef. The colour of the pileus is at first a fine red, passing into a pale yellow towards the base; in age it becomes deeper, and at length of a fine chocolate colour. The surface is rendered more or less rough by minute, prominent, rigid points, which may be denominated abortive tubes, as they are the termination of fibres which, under other circumstances, would have formed perfect ones. The hymenium is whitish or yellowish, and composed of a multitude of tubes between  $\frac{1}{4}$  in. and  $\frac{1}{2}$  in. in length, perfectly distinct from each other, but so connected to the substance of the pileus as not to be separated from it, as in the genus *Boletus*. In the young state the first appearance of the tube is in the form of

minute coloured warts, situated at a little distance from each other, the intervening spaces being filled up with a fibrous juicy mass, which gradually disappears as the tubes become developed. Some of the warts are conical, others furnished with a spreading radiated border of short filaments, which close the orifice and act as a veil to the infant tubes; the conical tubes are probably merely unexpanded. In this commencement of the tubes they are very short, scarcely more than a line in length, and barely possess a cavity. As they become more developed they elongate, approximate by the simple enlargement of their diameter, and gradually acquire an open orifice by the disappearance of the fimbriated veil. When at their full growth they are in complete contact, 2-4 lines in length, of a white colour, sometimes tinted with pink or even green, and quite open at the extremity, which is now only a little ragged. (Grev.)

## STROBILOMYCES. Berk.

Tubes equal, ample, not easily separating from the hymenophore; pileus fleshy, becoming tough, covered with large, imbricating scales; spores large, coloured, episporous rough.

*Strobilomyces*, Berk., Outl., p. 236; Stev., Brit. Fung., p. 182.

Most closely allied to *Boletus*, distinguished more especially by the pileus being covered with large scales, the flesh of the pileus becoming tough, and the large warted spores.

*Strobilomyces strobilaceus*. Berk. (fig. 7, p. 184.)

Pileus fleshy and pulvinate, 2-5 in. across, densely covered with large, imbricated, umber-brown floccose scales, margin with irregular fragments of the white veil; tubes white, deep, large, irregularly angular, adnate, but rather shorter round the stem; spores broadly elliptical, brown,  $12-13 \times 9 \mu$ ; episporous minutely warted; stem 3-6 in. long,  $\frac{1}{2}-\frac{3}{4}$  in. thick below, solid, subequal, coarsely fibrillose, brown below, white and sulcate above.

*Strobilomyces strobilaceus*, Berk., Outl., p. 236; Cke., Hdbk., n. 734; Stev., Fung. Brit., p. 182, fig. lxi.

In fir woods, &c. Flesh turning blackish or brown when broken, resembling a *Boletus* with a scaly pileus.

Pileus two inches broad, tessellated or cracked, like the cone of the Scotch fir. Pores very white. Stem 3-4 in. high, thick, solid. The stem is stated by Fries in his specific character to be nearly smooth. Persoon describes his species as sulcate, especially above, and furnished with a downy veil. The stem in Dickson's figure is rough with narrow erect scales. (Grev.)

### BOLETUS. Dill.

Sporophore pileate, stem central; hymenophore inferior, consisting of closely-packed, parallel, cylindrical or prismatic tubes that are distinctly differentiated and readily separable from the sporophore, openings or mouths of the tubes circular or angular (elongated and sinuous in the subgenus *Gyrodon*); hymenium lining the cavities of the tubes, basidia tetrasporous, spores large, elongato-fusiform, coloured.

*Boletus*, Dillenius, Fries, Obs. i. p. 109; Fries, Hym. Eur., p. 495; Cke., Hdbk., p. 249.

Annual. Usually large, pileus at first very convex or pulvinate, fleshy; either dry and more or less tomentose, or at first viscid. Flesh in many species changing colour, usually becoming blue when cut or broken. Stem central, often very stout, in some species ornamented with thin raised lines that anastomose to form a more or less regular network or reticulation, usually solid. In some species a veil is present, that remains as a ring round the stem at maturity. The tubes are easily removed from the pileus, and the dissepiments or walls of the tubes—in reality the tramal plates from which the hymenium proceeds—are in some species coloured red at the opening of the pores.

The peculiar property possessed by the flesh of some species in becoming a more or less intense blue when cut or broken, depends on the presence of two distinct substances in the flesh; one, a resinous substance that becomes blue when brought in contact with ozone; the other, a substance soluble in water, which ozonises the oxygen of the air, and then effects a combination with the resin, to which it gives

up its oxygen in the form of ozone, the result being a more or less intense blue coloration.

Starch has been proved to be present in the flesh of the stem and pileus of many species of *Boletus*. If a portion of the flesh, after the blue coloration above described has passed away, is touched with a solution of iodine, the blue coloration characteristic of the presence of starch is at once produced; this colour disappears on heating, but returns when cool; if the starch is extracted from the fungus by boiling water, and the solution mixed with a diastase (saliva), after remaining for some time it loses the power of becoming blue on the application of iodine, has, in fact, been converted into a sugar, which readily reduces a solution of Fehling's fluid or of cupro-potash. In most instances where starch is present in fungi, it is in solution in the cell-wall, as in the asci of many of the Discomycetes; in the sclerotium of *Claviceps purpurea* it is present in the form of small grains.

Hovering round *Boletus*, as a typical and central genus, are several genera, established as such by different mycologists. The genus *Strobilomyces*—kept up in the present book out of deference to its founder, the late M. J. Berkeley, called by Fries "The Prince of Mycologists"—is very closely allied, differing in fact from *Boletus* only in the coarsely scaly pileus. *Gyrodon*, founded as a distinct genus by Opatowski, differs in the very short tubes with sinuous openings, and is considered here as a subgenus, in which I have followed Fries. *Boletinus*, Kalchbr., differs in the tubes not leaving the flesh of the pileus by a plane surface, as in *Boletus*, but little points of the flesh of the pileus pass down into the tubes; the general aspect is, however, that of *Boletus*, and it is included by Fries as a subgenus. The only species, *B. cavipes*, Kalchbr., closely resembles in size, habit, and colour, *Boletus luteus*, being more umbonate, with a well-developed whitish veil, and pores decurrent, the openings rather elongated radially, and stem hollow; this species has not yet been found in Britain. *Polyporus* differs from *Boletus* in the trama or dissepiments of the pores being continuous with the flesh of the pileus; hence the tubes cannot be removed in a clean manner from the sporophore or flesh of the pileus.



*ANALYSIS OF THE SPECIES OF BOLETUS.**A. Pores yellow at the openings.*

Under this division are included those species having the openings of the pores yellow, orange, greenish, or cinnamon-brown *when mature*.

- \* Ring present on stem.
- \*\* Pileus dry, tomentose or silky.
- \*\*\* Pileus viscid, at least when moist; ring absent.
- \*\*\*\* Stem reticulated.

*B. Pores red at the openings, tubes more or less olivaceous.*

The red colour of the openings of the pores varies from crimson, through purple, to brownish-red.

*C. Tubes red throughout.*

The entire length of the tubes as well as the openings of the pores red.

*D. Tubes pale, dingy pink throughout.*

The entire length of the tubes, as well as the openings of the pores, dingy pink or pale flesh-colour.

*E. Tubes and openings of pores white or grey.*

In the present section both tubes and openings of pores are white at first, then often grey, in some species becoming brownish; but there is not at any age the least trace of yellow or red.

*Subgen. Gyrodon.**Tubes exceedingly short, openings sinuous.*

The above characters apply to the mature fungus; in many species of *Boletus* the tubes in the young state answer more or less to the above diagnosis, but the tubes elongate and the openings expand during development.

*A. Pores yellow at the openings.*

\* *Ring present on stem.*

**Boletus luteus.** Linn. (figs. 4-6, p. 184.)

Pileus 3-4 in. across, convex, covered at first with a thick coat of dirty, brown gluten, which eventually disappears, leaving the surface paler, and with darker streaks, flesh thick, whitish, unchangeable; tubes about  $\frac{1}{4}$  in. long, adnate, openings roundish, about  $\frac{1}{2}$  mm. across, yellow, tinged with cinnamon when old; stem 3-4 in. long,  $\frac{3}{8}$  in. thick, subequal, firm; above the large membranaceous, whitish ring, yellow and rough with darker raised points, below the ring, whitish, solid; spores cylindric-fusiform, cinnamon,  $10 \times 3 \mu$ .

*Boletus luteus*, Linn., Suec., n. 1247; Cke., Hdbk., p. 250.

On the ground, usually in pine woods. Distinguished by the very glutinous dirty-brown pileus and the ample whitish ring, which is sometimes more or less tinged with pink.

Pileus 3-4 in. broad, dingy yellow, convex, covered at first with thick brown gluten, which is soon washed off, but the pileus remains slightly viscid, and clothed with very minute matted silkiness. Flesh at first firm, whitish, not changing. Tubes adnate, dull yellow, nearly simple, their orifices round, or slightly waved. Spores ochraceous, ferruginous. Stem 4 in. high or more,  $\frac{1}{2}$  in. thick, straight or flexuous, at first white, but soon sordid, hoary beneath the white persistent ring, glandular above, sometimes the whole surface is glandular. (Berk.)

**Boletus elegans.** Schum.

Pileus 2-4 in. across, convex then almost plane, viscid, tawny-golden, or sometimes clear yellow, flesh rather thick, pale-yellow; tubes slightly decurrent, about  $\frac{1}{4}$  in. long, openings minute, simple, deep sulphur-yellow; stem firm 3-4 in. long,  $\frac{3}{8}$  in. thick or more, unequal or subequal, golden-yellow, then more or less rufescent, punctate above the whitish, fugacious imperfect ring; spores elliptical.

*Boletus elegans*, Schum., in Fries, Epicr., p. 409; Fries, Sverig ätl Svamp., t. 76; Cke., Hdbk., p. 250; Stev., Brit. Fung., p. 168.

In woods, especially larch.

Pileus 2-4 in. broad, convex, smooth, covered with a

glutinous substance, which gradually disappears, of a tawny or yellow colour, often irregularly spotted, and with a reddish tinge. Tubes of the hymenium yellow and decurrent, and adnate with the stipes, the orifice minute, uniform. Flesh thick, pale-yellowish, scarcely changing on being cut. Stipes solid, 2-4 in. long or more, firm, half an inch or more in diameter, somewhat attenuated upwards, or subequal, pale towards the upper part, especially above the veil, where it is generally dotted, below it is usually more or less streaked or stained with dull red. Veil very conspicuous, passing in the young state from the margin of the pileus to the stipes, to which it afterwards remains more or less attached. (Grev.)

***Boletus flavus*. With.**

Pileus 3-4 in. across, compact, firm, convex then expanded, smooth, even, yellow, covered with an evanescent tawny gluten, flesh thick, pale yellow, unchangeable; tubes about  $\frac{1}{4}$  in. long, abruptly adnate, openings angular, compound, large, irregular,  $\frac{2}{3}$ -1 mm. across, yellow, then tinged with cinnamon; stem 3-4 in. long, about  $\frac{3}{4}$  in. thick, equal or slightly thickened at the base, furnished at maturity with the remains of the membranaceous ring, above which the stem is vaguely reticulated and dingy yellow, below the ring, even, yellow tinged with rufous, flesh yellow, dingy at the base; spores pale olive, elongato-fusiform,  $10-13 \times 4 \mu$ .

*Boletus flavus*, Withering; Fries, Hym. Eur., p. 497; Cke., Hdbk., p. 250.

In woods. Allied to *Boletus elegans* and *B. luteus*; distinguished from the former by the large angular openings of the pores and the reticulated apex of the stem; from the latter by the bright yellow pileus after the gluten has disappeared, and by the reticulate, not punctate apex of the stem.

Pileus 2-5 in. broad, compact, in moist shady places glutinous and bright yellow, in exposed situations dry and brown; flesh pale yellow, not changing; tubes unequal, of a golden sulphur, wavy, sometimes with their orifices ruddy, ring dirty yellow, membranaceous. Stem 2-3 in. high, 6-9 lines thick, yellow spotted with purple, thickened at the base, reticulated above the ring. (Klotsch.)

**Boletus flavidus.** Fr.

Pileus  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. across, when quite young, umbonate, then gibbous, eventually almost plane, viscid, dingy yellow or pale brown, tinged more or less with pink, flesh pallid, thin; tubes about  $\frac{1}{2}$  in. long, decurrent, dingy yellow, openings large, angular, compound; stem 2–3 in. long, about 4 lines thick, subequal, usually more or less curved, whitish tinged with yellow, minutely glandular above viscous ring.

*Boletus flavidus*, Fries, Obs. i. p. 110; Stev., Brit. Fung., p. 169.

In pine woods, swamps, &c. A much more slender fungus than the other annulate species, and distinguished at once by the viscous veil. In Krombholz's figure quoted by Fries, the margin of the pileus is striate, as is also the apex of the stem.

Stem furnished with a ring, 2–3 in. long, whitish or yellowish, slender, the thickness of a goose-quill or a little more, equal, not in the least incrassated at the base, even tough, straight or subflexuous; varies with a striate stem, Pileus convex, pulvinate, pale yellow, or greyish-yellow, sometimes umbonate, glabrous, dry, or in rainy weather viscid, 2–3 in. broad, margin sometimes regular and spreading, at others irregular and repand, hymenium plane. Flesh yellowish, soft, unchangeable, sometimes distinctly greyish. Tubes  $\frac{1}{4}$ – $\frac{1}{2}$  in. long, yellow. Pores angular, large, irregular, subcompound, attached to the stem and often decurrent. (Fries.)

**\*\* *Pileus dry, tomentose or silky.***

**Boletus chrysenteron.** Fr.

Pileus 2–4 in. across, convex then expanded, becoming almost plane, soft, minutely tomentose, brownish with an olive tinge, often cracked into areolae, interstices reddish, flesh rather thin, pale, yellow, red just underneath the cuticle, with a transient shade of blue; tubes up to  $\frac{1}{2}$  in. long, subadnate, yellow then greenish, openings angular, irregular, compound, largest near the stem, where they are 1–1.5 mm. across; stem 2–3 in. long,  $\frac{1}{4}$ – $\frac{3}{4}$  in. thick, subequal or slightly swollen below the middle, rigid, fibroso-striate,

yellow, more or less tinged with red, solid, flesh deeper yellow than that of the pileus, usually stained with red; spores elongato-fusiform, pale olive,  $12-14 \times 4 \mu$ .

*Boletus chrysenteron*, Fries, *Epicrisis*, p. 415; Cke., *Hdbk.*, p. 254.

In woods and pastures. At first continuously covered with a dense olive tomentum, which eventually becomes cracked, the cracks are red. Stem generally crooked, more or less streaked with red. Allied to *Boletus subtomentosus*, from which the present species is known more especially by the red colour of the flesh below the minutely velvety surface.

Pileus 2-3 in. or more broad, of various colours, but chiefly some shade of red, olive or yellow, pulvinate, minutely downy; specimens often cracked in polygons, the interstices reddish; flesh white or yellowish, changing slightly to blue. Tubes adnate or ascending and then subdecurrent, large, dull yellow, simple, blue when bruised. Stem 3 in. high,  $\frac{1}{4}-\frac{1}{2}$  in. thick, nearly smooth, very firm, yellow streaked more or less with red, generally crooked, particularly at the base, which is often suddenly attenuated, though sometimes that part is thickest, changing slightly to blue when cut. (Berk.)

*Var. nanus*, Mass. Pileus about 1 in. across, convex, covered with a continuous olive tomentum, which does not crack; flesh pale yellow, and like that of the stem changing to red when cut; tubes about 2 lines long, adnate, yellow, eventually with a green tinge, openings elongated, sinuous, narrow; stem 1 in. long,  $\frac{1}{4}$  in. thick, slightly swollen below the centre, firm, yellow, streaked or spotted with crimson below, flesh red at the base from the first; spores elongato-fusiform, pale olive,  $10 \times 3 \mu$ .

Amongst grass under trees. Distinct from the type in the smaller size, in the flesh of pileus and stem becoming red when cut, and in the elongated, narrow, sinuous or gyrose openings of the pores. May possibly prove to be a distinct species.

*Var. versicolor*, Rost. Pileus about  $1\frac{1}{2}$  in. across, nearly plane, minutely velvety, bright deep rose-pink; tubes shorter round the stem, but adnate,  $\frac{1}{4}$  in. long, openings large, angular, yellow, greenish when old; stem  $1\frac{1}{2}$  in. long,

$\frac{1}{4}$  in. thick, apex yellowish, rest more or less red, solid; spores pale yellow, fusiform,  $10 \times 3 \mu$ .

*Boletus versicolor*, Roskovius, in Sturm's Deutchl. Fl., t. 10; Fries, Hym. Eur., p. 504.

In woods. Distinguished by the clear rose-pink tomentose pileus. Although Fries accepts the above as a species, he says that he has seen a variety of *B. chrysenteron* exactly similar, and considers that it may be a variety of the last-named species.

***Boletus striaepes*. Secr.**

Pileus convex then expanded, soft, silky, olive, ferruginous under the cuticle; tubes adnate, angular, greenish, pores minute, yellow; stem firm, curved, yellow, with blackish-brown striations, base reddish-brown.

*Boletus striaepes*, Secretan, Fl. Mycol. Suis., n. 32; Fries, Hym. Eur., p. 502; Berk., Outl., p. 232.

In pine woods. A species respecting which but little is known in this country. Appears to be near *Boletus chrysenteron*.

***Boletus subtomentosus*. Linn.**

Pileus 2-4 in. across, convex then expanded, soft, dry, velvety, dingy olive, dark umber-brown with olive tinge, or yellowish-brown, often cracked in an areolate manner, the interstices yellowish, no tinge of red under the cuticle; tubes adnate,  $\frac{1}{2}$  in. long, openings angular,  $\frac{3}{4}$ -1 mm. across, yellow; stem 2-3 in. long,  $\frac{3}{4}$  in. thick, attenuated at the base, often slightly ventricose, more or less ribbed, yellowish, usually streaked with red, solid; spores elongato-elliptical, pale brownish-olive,  $13-14 \times 5 \mu$ .

*Boletus subtomentosus*, Linn., Suec., n. 1251; Fries, Hym. Eur., p. 503; Bulliard, t. 393; Stev., Brit. Fung., p. 172.

In woods. Resembling *Boletus chrysenteron* in size, habit, and general appearance, but known by the absence of a red tinge under the tomentum of the pileus. The stem is slightly rough with minute points. Young specimens of *B. chrysenteron* may be mistaken for the present species, unless a section of the pileus is made, when the red colour of the flesh below the cuticle decides the point. Berkeley says that the present species often grows on beech-nuts.

Stem attenuated downwards. When the pileus is cracked the cracks are yellowish. Flesh white or pallid, not red below the cuticle. After the olive tomentum has disappeared the pileus is brighter, variable. (Fries.)

*Var. radicans.* Mass.

Pileus expanded, usually undulated, tomentose, bright yellowish olive-green; tubes greenish-olive at maturity, stem whitish below, yellow and strongly grooved above.

*Boletus radicans*, Krombholtz, t. 48, fig. 1-6.

In woods. Differing from the type in the points indicated, in size and other respects similar.

*Boletus cruentus.* Vent.

Pileus 3-4 in. across, convex then almost plane, soft, minutely tomentose, olivaceous with a reddish tinge, becoming red at once when bruised, flesh  $\frac{3}{4}$  in. thick, pale yellow changing to red when cut; tubes shortened round the stem and almost free,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, pale yellowish-olive, openings minute, subangular, regular, about  $\frac{1}{2}$  mm. diameter; stem 2-3 in. long, tapering upwards, 1-1 $\frac{1}{2}$  in. thick at the incrassated base, which ends in a tapering rooting portion, yellow with reddish markings, minutely flocculose, solid, flesh yellow, becoming red like that of the pileus when cut; spores elliptic-fusiform, pale olive, 14-16  $\times$  5  $\mu$ .

*Boletus cruentus*, Venturi, t. 43, f. 3 & 4; Fries, Hym. Eur., p. 507.

On the ground, under beeches. Smell strong. Not agreeing in every particular with Venturi's species, but corresponding in the essential features of the flesh becoming red when cut, and rooting base of stem.

*Boletus sanguineus.* With.

"Tubes yellow; pileus blood-red, changing to a rich red-brown; stem-yellow, with broad crimson streaks.

"Tubes yellow, a little decurrent, unequal in length, but mostly about  $\frac{1}{2}$  of an in. long, changing to deep blue when broken. Pores lemon-yellow, angular.

"Pileus crimson, semiglobular,  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. over; when old, rich red-brown, near 3 in. over, and the edge turning up. Flesh white, a little tinged with crimson next to the skin, changing slowly to a bluish cast when wounded. Stem,

blotches or streaks of dilute crimson on a yellow ground, apparently twisted, 1-2½ in. high, near ⅓ths diameter. In the larger specimens the base is bulbous.

"I have never found this species elsewhere than in the spot mentioned below, and no author I meet with has figured it. In its button state the blood-red pileus, the yellow and crimson stained stem, and the fine lemon-coloured pores, render it a beautiful object. I only once found it in an expanded state as described above, growing on the same spot, but am rather doubtful as to the identity of the species.

"Between the large square stew and the wall in Edgbaston Park."

*Boletus sanguineus*, Withering, Arr. Brit. Pl., ed. 3, vol. iv. p. 319.

The above is the unabridged description given by Withering, of the fungus called by him *Boletus sanguineus*; although in some respects it resembles, from the description, *Boletus chrysenteron*, yet it appears to be quite distinct in the short tubes, &c., and the last-named is described very accurately by Withering next to *B. sanguineus*.

Whatever the species may be, it is certainly not the *Boletus sanguineus*, With., of Fries, Epicr., p. 412, and Hym. Eur., p. 500. Fries admits in his latest work that he had never seen the species, but only a figure by Sowerby, tab. 225, which he supposes to represent Withering's plant, and the description given by Fries in Hym. Eur. is a compound of Withering's description and Sowerby's figure, it is also stated to be viscid, a character not mentioned by either Withering or Sowerby. The following is Sowerby's description of the fungus he calls *Boletus communis*, Bull., t. 393, and quoted by Fries as *Boletus sanguineus*, With.

"Found in woods, frequently of this bright colour, especially when in a young state. It is no less frequently of a duller colour, resembling the pileus of *B. scaber*, tab. 175. The yellow or lemon-coloured pores, and their being straight from the edge of the pileus to the stipes (scarcely decurrent) will readily distinguish the one from the other. Does not Dr. Withering's *B. sanguineus*, 319, belong to this species? It changes blue when cut."

Now Sowerby's figure of what he calls *Boletus communis*, figured on tab. 225, may be described as follows from the figure.



Pileus 2-5 in. across, convex then expanded, smooth, even blood-red with a tinge of purple in some of the younger specimens; tubes  $\frac{1}{2}$  in. or more long, adnate, plane, openings large, pale olive-green when mature; stem 3-4 $\frac{1}{2}$  in. long,  $\frac{3}{8}$  in. or more thick, equal, yellow, more or less streaked with red, especially upwards, flesh, like that of the pileus, yellowish.

As already stated, this is considered by Sowerby to be *Boletus communis*, Bulliard, t. 393, but the latter is quoted by Fries under *Boletus subtomentosus*, and the figure certainly appears to agree with the last-named species, and has not a trace of red about the pileus, hence it appears certain that Sowerby was wrong in referring his plant to Bulliard's *B. communis* (= *B. subtomentosus*), and as it does not agree in habit and other particulars with *B. chrysenteron*, it may be considered as a distinct species, but until, like Withering's species, it is met with again, it had better remain as it is, now that attention has been called to the matter. The curse of establishing species from figures presses already heavily enough on the systematist without adding to the load.

In Cooke's Handbook and Stevenson's British Fungi, Fries' description of *Boletus sanguineus* is copied without comment.

#### *Boletus impolitus*. Fries.

Pileus 4-6 in. across, convex, then more or less expanded, flocculose, at length granuloso-rivulose, not polished, rather pale yellow-brown, flesh thick, pale yellow below the cuticle; tubes nearly free,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, openings minute, yellow; stem 2-3 in. long, 1 $\frac{1}{2}$ -2 in. thick at the base, somewhat bulbous or inflated below, yellow, even, pubescent, sometimes tinged with red near the apex; spores pale olive, elongato-fusiform, 14-15  $\times$  5  $\mu$ .

*Boletus impolitus*, Fries, Epicr., p. 421; Fries, Sverig. atl. Svamp., t. 42.

In woods.

A large fine species, pileus yellow-brown or tawny-brown, tomentose, sometimes cracking into areolae. Stain yellow, tomentose, not reticulated. Attains a diameter of 4 in. or more; stem about 2 in. Flesh more or less changing to blue when cut. Often very large. (Cooke.)

**Boletus sulphureus.** Fr.

Pileus convex, then plane, compact, silky-tomentose, sulphur-yellow, flesh pale-yellow, becoming more or less blue when broken, but golden yellow when exposed to the air, reddish near the tubes; tubes 1-2 lines long, adhering more firmly together than usual, changing colour when touched, at length spotted with rust-colour; openings minute, compound, sulphur-yellow, then greenish; stem 1-2 in. long, 1 in. thick, firm, ventricose, even, smooth, sulphur-yellow, then dingy ferruginous; spores pale-yellow, then ochraceous.

*Boletus sulphureus*, Fries, *Epior.*, p. 413; *Stev.*, *Brit. Fung.*, p. 171.

Amongst sawdust, chips, &c.

In dense clusters, springing from a broadly expanded, woolly, golden-yellow mycelium, with the appearance of *Agaricus spectabilis*. Pilei wavy and growing into each other. (Fries.)

**Boletus varicolor.** B & Br.

Pileus  $1\frac{1}{2}$  in. across, convex, olive, subtomentose, margin involute, flesh thick, blackish-purple below the cuticle, remainder like that of the stem white, tinged yellow here and there; pores about 2 lines long, free, openings minute, yellow; stem about 2 in. long, base thickened,  $\frac{3}{4}$  in. or more across,  $\frac{1}{2}$  in. thick at apex, apex reticulated, minutely pubescent and rufescent upwards, yellowish below, solid; spores elliptic-fusiform, slightly oblique, pale olive,  $14 \times 4 \mu$ .

*Boletus varicolor*, B. & Br., *Ann. Nat. Hist.*, n. 1020, pl. 13, f. 3 (1865); Cke., *Hdbk.*, p. 255.

In woods. Agreeing with *B. olivaceus* in having the margin involute, but distinguished from this and other allies by the dark-purple colour below the cuticle of the pileus. The gills are described as free by B. & Br., and figured as broadly adnate, but an examination of the type specimens show them to be shortened round the stem. With the habit of *B. subtomentosus* and *B. chrysenteron*, but the stem is clavate and reticulated.

**Boletus olivaceus.** Schaeff.

Pileus 2-3 in. across, convex, margin at first involute, brownish-olive, glabrous; tubes adnate, 2-3 lines long,

openings minute, unequal, yellowish-olive; stem firm, clavate, bulbous, the thin apex yellow, remainder more or less covered with crimson blotches or entirely crimson, vaguely reticulated or punctate with red, solid; spores ?.

*Boletus olivaceus*, Schaeffer, tab. 105; Cke., Hdbk., p. 255.

In woods. A rare species that I have not seen, neither can I find any specimens in herbaria, hence cannot give form or size of spores. Flesh of pileus  $\frac{1}{2}$  in. or more thick, tinged yellow, becoming blue when cut; this colour soon fades, leaving the flesh white. Stem  $1\frac{1}{2}$ -2 in. long,  $1-1\frac{1}{2}$  in. across at thickest part, thinner upwards. Known by incurved margin when young, glabrous pileus, and reddish, vaguely reticulated obese stem.

***Boletus fragrans*. Vitt.**

Fasciculate or solitary. Pileus 1-4 in. across, convex, dark-brown or umber-brown, often wavy, slightly tomentose, margin incurved; flesh very thick, yellowish, sometimes unchangeable, at others changing to green or blue, and finally becoming reddish when broken; tubes shortened round the stem and almost free,  $\frac{1}{2}$  in. or more long, openings small, roundish, yellow then greenish; stem at first stout, ovate, usually tapering at the base, then lengthening and becoming thinner upwards, even, variegated with yellow and red, solid; spores pale olive, elongato-fusiform,  $10-12 \times 4 \mu$ .

*Boletus fragrans*, Vittadini, Fung. Mang., p. 153, t. 19; Stev., Brit. Fung., p. 34.

In woods, under oaks, &c. Pileus bronze-brown, sometimes with purple shades. Often grows in dense clusters, and in this particular differing from any other British species. Very good for eating.

***Boletus aestivalis*. Fr.**

Pileus 5-8 in. across, convex, whitish or pale buff, minutely silky, often cracking into areolae, margin often wavy, flesh very thick, white under the cuticle, lower down and that of stem yellow, unchangeable; tubes shortened round the stem,  $\frac{1}{2}$  in. or more in length, openings minute, equal, yellow; stem about 3 in. long, very thick, more or less bulbous, subconical, pale yellow or whitish, even, solid, flesh at base

usually with a reddish tinge; spores pale olive, elongatofusiform,  $13-14 \times 4 \mu$ .

*Boletus aestivalis*, Fries, Epicr., p. 422; Cke., Hdbk., p. 257.

In pastures under trees, &c. Esculent, one of the largest species of the genus, distinguished from its allies by the pale-coloured pileus, which varies from white, through grey, to pale tan, yellow tubes, unchangeable flesh, and stout stem, which is often 2 in. across at the thickest part.

**Boletus fulvidus. Fr.**

Pileus  $2-3\frac{1}{2}$  in. across, convex then plane, minutely silky, shining, dry, firm, foxy brown; pores up to  $\frac{1}{4}$  in. long, depressed round the stem and free, openings small, equal, angular, about  $\frac{1}{3}$  mm. across, white, then yellow with a tinge of olive when old; stem  $1\frac{1}{2}-2$  in. long,  $\frac{2}{3}$  in. thick, equal or a little attenuated downwards, firm, smooth, shining, coloured like the pileus, solid, flesh like that of the pileus yellowish white, unchangeable; spores elliptic-oblong, white with a yellow tinge,  $10-11 \times 5 \mu$ .

*Boletus fulvidus*, Fries, Obs. 2, p. 247; Fries, Hym. Eur., p. 517.

On the ground under trees. Flesh of pileus and stem firm and rigid. The stem becomes more or less hollow with age. Allied to *Boletus castaneus*, which, however, is readily known by the velvety stem. Fries says that the intensity of colour of the pileus is variable.

**Boletus castaneus. Bull.**

Pileus 2-4 in. across, convex then expanded, becoming almost plane, or even depressed, firm, even, minutely velvety, pale chestnut, tubes free, short, about  $\frac{1}{4}$  in. long, free from the stem, openings minute, round, white then yellow; stem 2-3 in. high, base slightly incrassated, slightly attenuated upwards, even, more or less velvety, same colour as the pileus or paler, becoming imperfectly hollow with age.

*Boletus castaneus*, Bull., t. 328; Krombh. t. 4, f. 28-30; Stev., Brit. Fung., p. 181.

In woods. Flesh white, unchangeable, rather thick. In Bulliard's figures the pileus is reddish cinnamon, in those of Krombholtz bright but rather light chestnut; the stem is also indicated as distinctly hollow.

Smaller than *Boletus cyanescens*, not juicy. Pileus at first encircling the base of the somewhat marginato-bulbous stem, which is not constricted at the apex as in *B. cyanescens*. (Fries.)

Pileus 3 in. broad, depressed when old, but broadly pulvinate in the centre, subtomentose, the down raised up into little flat scales, beautiful dark rufous tan; flesh thick, mottled, stained beneath the cuticle with the colour of the pileus, not changing colour, viscid, insipid or subacid; tubes vivid yellow, half-free, not reaching to the extreme margin; spores yellow; stem sometimes short, swelling in the centre, attenuated below, hollow, sometimes long and equal, beautifully tinged with yellow and rufous. (Berk.)

Solitary. Stem 2-3 in. long,  $\frac{1}{2}$ -1 in. thick, constantly very smooth, subattenuated upwards, cylindrical, firm, colour of the pileus or a little paler. Pileus pulvinate, even, dry, villosopulverulent or nearly glabrous, 2 in. broad, chestnut, margin patent, obtuse, hymenium almost plane. Flesh white, unchangeable, or becoming pale lilac-chestnut towards the edges when broken. Tubes about equal in length to the thickness of the flesh of the pileus, straight, straw-colour, at length yellow, equal, minute, subrotund, not decurrent. (Fries.)

***Boletus spadiceus*. Schaeff.**

Pileus 2-4 in. across, convex then expanded, sometimes becoming almost plane, dry, tomentose, bay-brown, opaque, often irregularly cracked; flesh thick, white, reddish-brown under the cuticle; tubes adnate,  $\frac{1}{4}$ - $\frac{2}{3}$  in. long, openings minute, subrotund, yellow; stem 2-3 in. long,  $\frac{3}{4}$ -1 in. thick at the base, attenuated upwards, even, flocculoso-furfuraceous, yellowish-brown, solid, flesh yellowish.

*Boletus spadiceus*, Schaeffer, t. 126; Stev., Brit. Fung., p. 173.

In woods. Solitary or in clusters of 2-3. Stem firm, pale yellowish-brown in Schaeffer's figure, deep orange-brown in Krombholz's figure, tab. 36, f. 19 and 20, also quoted by Fries under the present species. The stem is not red at all.

***Boletus vaccinus*. Fr.**

Pileus 2-4 in. across, convex then expanded, minutely

tomentose, margin obtuse, deep chestnut-colour, flesh whitish, unchangeable, tinged red under the cuticle; tubes about  $\frac{1}{4}$  in. long, almost free from the stem, openings minute, rounded, white then sulphur-yellow, stem 2-3 in. long,  $\frac{3}{4}$ -1 in. thick, variable, sometimes bulbous, at others attenuated downwards, paler than the stem, solid, flesh brownish at the base; spores very pale yellow, elongato-fusiform,  $15-16 \times 5 \mu$ .

*Boletus vaccinus*, Fries, Epicrisis, p. 420; Fries, Sverig. Svamp. tab. 51.

In woods, especially under beech-trees. Allied to *Boletus badius*, but known by the minutely tomentose, dry pileus, and the much smaller openings of the pores, that rarely exceed  $\frac{1}{3}$  mm. across. Often subcaespitose. Although Fries says the flesh is unchangeable, yet in the section of his fig. in Sverig. Svamp. it is tinged blue. I have never observed any trace of blue.

**Boletus Rostkovii. Fr.**

Pileus 3-4 in. across, convex or almost plane, dingy olive-brown or rufous, very minutely tomentose, often areolately cracked, interstices pale; flesh thick, compact, white, becoming tinged red when cut, here and there a shade of blue; tubes about  $\frac{1}{2}$  in. long, pale yellow-green, openings irregularly angular, compound, about  $\frac{2}{3}$  mm. diameter; stem obconic, 1 in. across at the apex, tapering almost to a point, about 1 in. long, smooth, pale reddish-yellow, solid, flesh tinged like that of pileus; spores elongato-fusoid, pale olive,  $20 \times 5 \mu$ .

*Boletus Rostkovii*, Fries, Hym. Eur., p. 521.

*Boletus lividus*, Rost., Sturm, Cr. Fl., t. 18.

On the ground under trees. Known at once by the short obconic stem and the flesh becoming tinged with red when broken.

**Boletus purpurascens. Rost.**

Pileus 3-4 in. across, convex then almost plane, dry, glabrous, deep purple with a tinge of brown, flesh thick, compact, dirty grey, streaked or marbled; tubes adnate,  $\frac{1}{2}$  in. or more in length, dingy yellow, openings same colour, small, irregularly circular, about  $\frac{1}{2}$  mm. across; stem about 2 in. long,  $\frac{3}{4}$  in. thick at the apex, tapering downwards and

ending in a rooting base, even, glabrous, deep purple-red; spores elliptic-fusiform, pale olive,  $15 \times 4-5 \mu$ .

*Boletus purpurascens*, Rostkovius, in Sturm, Cr. Fl., t. 8; Fries, Hym. Eur., p. 504.

In woods. Resembling *Boletus purpureus* in the purple pileus, but distinguished by the mouths of the tubes being yellow and not red. The tubes become green when bruised.

***Boletus radicans*. Pers.**

Pileus 3-4 in. across, convex, then nearly plane and often flexuous, minutely velvety, greyish-olive and becoming yellowish-red, flesh white, unchangeable or with a vague tinge of blue here and there, thick except at the permanently incurved margin; tubes about  $\frac{1}{2}$  in. deep, adnate, openings irregularly angular, bright yellow; stem  $2\frac{1}{2}$ -3 in. long,  $\frac{3}{4}$ -1 in. thick at the apex, tapering downwards and ending in a rooting base, solid, yellow, sprinkled with red particles; spores elliptic-oblong, pale yellow,  $16 \times 4 \mu$ .

*Boletus radicans*, Pers., Synopsis, p. 507; Fries, Hym. Eur., p. 503.

On the ground under trees. Allied to *Boletus chrysenteron*, but distinguished by the permanently incurved margin of the pileus, and the stouter stem tapering downwards and ending in a rooting base; the pores are also smaller, averaging  $\frac{1}{2}$  mm. across.

***Boletus cyanescens*. Bull.**

Pileus 2-5 in. across, convex, becoming expanded and sometimes wavy, closely tomentose or floccoso-squamose, opaque, tan-coloured or brownish, flesh thick, white, becoming deep blue when broken; tubes about  $\frac{1}{2}$  in. long, free or almost so, openings minute, rounded, white then pale lemon yellow; stem 2-3 in. long, thickened below, where it is sometimes  $1\frac{1}{2}$  in. diameter, villosopruinose, coloured like the pileus, stuffed then imperfectly hollow; spores very pale yellow, fusiform,  $14-16 \times 4 \mu$ .

*Boletus cyanescens*, Bulliard, t. 369; Cooke, Hdbk., p. 260.

In woods. Pileus 2-5 in. broad, rigid, pale, straw-colour, subfuliginous, the margin acute; flesh white, when broken changing instantly to the most beautiful azure blue, and when squeezed distilling a blue juice; tubes short, when young scarcely a line long, white or lemon-coloured; stem

distinct from the pileus, the apex contracted, brittle, never reticulated, but villosopruinose. (Fries.)

Stem, as in other species, solid; but in this species the stem is stuffed with a softer, rather spongy (not elastic) substance that is contiguous with the outer firm portion, naked,  $1\frac{1}{2}$ – $2\frac{1}{2}$  inches long, thickened at the base, ventricose, always even, glabrous or villosopulverulent, white, sometimes yellowish, when touched becoming olive or smoky-grey, flesh white, becoming bluish; pileus when young semiglobose, soon convex and plane below, at length almost plane and convex below, fleshy, not elastic, 2–5 in., yellowish, sometimes bright, at others pallid, sometimes even greyish; villosopulverulent, due to short, partly adpressed hairs, rarely glabrous, margin patent, acute; flesh white, when broken becoming blue, when squeezed giving out a bright blue juice. Pores minute, subrotund, white, free from the stem, also becoming bright blue when wounded. (Fries.)

**Boletus parasiticus.** Bull.

Pileus  $1\frac{1}{2}$ –2 in. across, convexo-plane, dry, silky, usually becoming cracked in an areolate manner, dingy, yellowish-tan, flesh about 2 lines thick, equal; tubes subdecurrent, about 2 lines long, yellow, then reddish-orange or dingy cinnamon, openings rounded, sometimes compound, about  $\frac{1}{2}$  mm. across, stem  $\frac{1}{2}$ –2 in. long, incurved, coloured like the pileus, solid, flesh yellow; spores pale olive-brown, elongatofusiform,  $12$ – $13 \times 4 \mu$ .

*Boletus parasiticus*, Bull., t. 431, f. 1; Cke., Hdbk., p. 253.

Parasitic on species of *Scleroderma*. Known by its peculiar habitat. Apparently a variable species in colour.

Berkeley and Broome say, "Pileus silky, dirty yellow, as well as the incurved, rigid, slightly silky stem; flesh of a pale reddish hue; tubes decurrent, labyrinthiform, reddish. It is certainly not viscid in any stage of growth."

Cooke remarks on the above, "We have met with it several times, but there has not been any reddish tint in the tubes of our specimens. Hence, they may vary in colour. Tubes at first sulphur-colour, yellow, then reddish-orange. Spores spindle-shaped, elongated, pale brown, very different from the last (*B. rubinus*),  $.0005 \times .00015$  in."



Finally, I have collected specimens in Epping Forest having the pileus and incurved stem dingy tan-colour, tubes at first yellow, then dingy cinnamon.

***Boletus duriusculus.* Schulz.**

Pileus 2-5 in. across, hemispherical, minutely velvety, viscid when moist, varying in colour from pale brown, through dingy chestnut, to umber-brown, often becoming cracked in an areolate manner when dry, interstices paler; flesh thick, white or tinged yellow, when cut becoming reddish copper-colour; tubes  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, shortened round the stem and free, openings about  $\frac{3}{4}$  mm. across. often compound, irregularly angular, bright yellow; stem 4-7 in. long, fusiform, thickest part  $1\frac{1}{2}$ -2 in. across, situated below the middle, yellowish, rough with blackish points, which are sometimes arranged in a subreticulate manner, apex sometimes more or less grooved, solid, flesh of upper part becoming coppery like the pileus; spores elongato-cylindrical, pale umber,  $14-16 \times 5-6 \mu$ .

*Boletus duriusculus*, Schulzer, Icon. Sel. Hymen. Hung., p. 51, t. xxxiii., fig. 1; Fries, Hym. Eur., p. 515.

In woods. Esculent and very delicious. Allied to *Boletus scaber*, but distinguished by the bright yellow tubes and the very firm flesh, which turns coppery-red when exposed to the air; this colour eventually changes to a dingy greyish-violet. Also allied to *Boletus porphyrosporus*.

***Boletus pruinatus.* Fr.**

Pileus 2-3 in. across, convex, becoming expanded, rigid, dry, purplish-bay or dark cinnamon with a red tinge, covered with an umber-coloured bloom, flesh rather thin, white, becoming indistinctly greenish or bluish sometimes; tubes about  $\frac{1}{4}$  in. long, openings minute, rounded, yellow; stem about 2 in. long,  $\frac{1}{4}$  in. thick above, rather ventricose towards the base, even, smooth, yellow, more or less streaked with red.

*Boletus pruinatus*, Fries, Bolet., p. 9; Stev., Brit. Fung., p. 174.

In grassy ground under trees, &c. Solitary, or often more or less clustered, with somewhat the habit and appearance of certain forms of *Boletus chrysenteron*, but distinguished by the

small rounded openings of the tubes, and the pileus covered with a dark coloured bloom.

***Boletus variegatus.* Swartz.**

Pileus 3-5 in. across, convex then expanded, obtuse, margin acute, dingy yellow or pale tawny at the disc, paler yellow towards the margin, covered with minute pilose, tawny squamules, viscid when moist, flesh thick, yellow, becoming pale blue when cut; tubes  $\frac{3}{4}$  in. long, adnate, openings small, unequal, yellowish, then cinnamon or brownish; stem 2-3 in. long, up to 1 in. thick, subequal, firm, pale yellow, solid; spores pale olive, elliptical,  $6 \times 3 \mu$ .

*Boletus variegatus*, Swartz, in Vet. Akad. Handl., p. 8; Cke., Hdbk., p. 253.

In fir woods, amongst heather, &c. Often gregarious. Pileus tawny and minutely adpressed, squamulose at the disc, becoming pale yellow towards the margin, in some instances the flesh does not become blue on being cut. Fries says that the stem is sometimes reddish.

Pileus 3 in. or more broad, convex, fasciculato-squamose; scale small, tawny-yellow; flesh changing to blue when cut; margin tomentose, subinvolute; tubes very narrow, dull yellow, blue when bruised, adnate; resembling somewhat those of *B. bovinus*; stem 3 in. high,  $\frac{3}{4}$  in. thick, granulato-pulverulent, very neat, firm, yellow, obtuse. Smell unpleasant, taste not so. (Berk.)

Stem naked, 1-3 in. long,  $\frac{1}{2}$ -1 in. thick, subequal, glabrous, smooth, cylindrical, every part yellow, rarely reddish. Flesh of the stem pale yellow, unchangeable, elastic, not spongy. Pileus plano-convex, sometimes covered with minute squamules, sometimes glabrous, dry, slightly viscid during rainy weather, yellow, margin acute, even, hymenium slightly concave when young, then plane; diameter 3-5 in., flesh pale yellowish, soft, not elastic, rather thick, usually unchangeable, rarely tinged with blue when broken. Tubes shorter than the thickness of the flesh of the pileus, adfixed, yellowish-grey; pores obscure yellow, when young almost spadiceous, then grey or greenish-yellow, equal, minute, subrotund or obtusely angular. (Fries.)

***Boletus aereus.* Bull.**

Pileus 3-4 in. across, convex, glabrous, dark brown with a

tinge of olive or blackish-brown, flesh thick, white, assuming a yellowish tinge when broken; tubes almost free from the stem, about  $\frac{1}{2}$  in. long, openings minute, rounded, sulphur-coloured; stem 3-4 in. long, 1 in. or more thick, yellowish, brownish towards the base, or sometimes entirely pale brown, somewhat reticulated, solid; spores oblong fusiform,  $12-14 \times 5 \mu$ .

*Boletus aereus*, Bull., Champ., p. 321; Stev., Brit. Fung., p. 176.

On woods. Distinguished by the very dark brown or blackish pileus and the short sulphur-coloured tubes. The stem sometimes shows no trace of reticulations. According to Krombholz the fungus much exceeds the dimensions given above.

***Boletus carnosus*. Rostk.**

Pileus 4 in. across, convex, glabrous, bay-brown, flesh thick, pale yellow; tubes shortened close to the stem, partly adnate, about  $\frac{1}{2}$  in. long, openings rather large, angular, yellow; stem  $2\frac{1}{2}$  in. long, firm, subequal, yellow and more or less streaked with reddish-brown, substrate, solid.

*Boletus carnosus*, Rostkovius in Sturm's Deutschl. Fl., Pilze, p. 63, t. 14; Fries, Hym. Eur., p. 520.

In woods. Included by Fries amongst species of doubtful affinity, but the figure given by Rostkovius is very good, as is also his diagnosis, and the fact of a fungus having been found in England by the late M. J. Berkeley, agreeing with the above, justifies the assumption that it is a good species.

\*\*\* *Pileus viscid when moist, ring absent.*

***Boletus badius*. Linn.**

Pileus 3-5 in. across, slightly convex, rather viscid and minutely tomentose when young, soon becoming dry and smooth, bay-brown, flesh thick, white, slightly tinged blue near the pores when cut; tubes about  $\frac{2}{3}$  in. long, slightly depressed round the stem but not free, yellow then yellowish-green, becoming green when bruised, openings subrotund, irregular, here and there compound, from  $\frac{1}{2}$ -1 mm. across; stem 2-3 in. long,  $\frac{3}{4}$  in. thick, subequal, even, equal, dirty ochraceous mottled and streaked with pale brown, base white, cottony; spores olive, elliptic-oblong,  $12-14 \times 3-4 \mu$ .

*Boletus badius*, Linn., Suec., n. 1246; Cke., Hdbk., p. 252.

On the ground in woods, usually pine. Known by the bay-brown pileus, which is viscid in wet weather and shining when quite dry, and the yellowish pores becoming deep bluish-green at once when bruised. The flesh of the pileus is usually faintly tinged red when cut.

Stem equal, 3 in. long, 1 in. thick, never reticulated. Pileus very fleshy, soft, villos-viscosous when young, then almost glabrous, dry, hemispherical, 3-6 in. broad; flesh 1-2 in. thick, white, soft. Tubes long, bluish-green when bruised. (Fries.)

***Boletus piperatus*. Bull.**

Pileus 1-3 in. across, convexo-plane, soft, slightly viscid, ochraceous-tan, sometimes with a tinge of red; tubes up to  $\frac{1}{4}$  in. long, decurrent, openings large, irregularly angular, at first pale olive, then cinnamon, finally bright cinnamon-brown; stem  $1\frac{1}{2}$ -2 in. long,  $\frac{1}{4}$  in. thick, equal or slightly thinner downwards, smooth, even, darker than the pileus, base usually bright yellow, solid, flesh, like that of pileus, yellow, often tinged with flesh-colour in the pileus; spores elongato-fusiform, cinnamon-colour,  $10-12 \times 3-4 \mu$ . Taste very hot and pungent.

*Boletus piperatus*, Bull., t. 451, f. 2; Cke., Hdbk., p. 252.

On the ground in woods. Distinguished by the acrid, pungent taste, and by the deep cinnamon-brown or almost ferruginous tubes at maturity.

Pileus 1-3 in. broad, at length plane, moist or even glutinous, reddish-yellow or brownish. Flesh yellow, not changing colour. Tubes large, subdecurrent, angular, reddish yellow, or ferruginous. Stem 1-2 in. high, 3-4 lines thick, more or less deep yellow. Taste remarkably acid and pungent. (Grev.)

***Boletus paludosus*. Massee. (n. sp.)**

Pileus 3-4 in. across, slightly convex then quite plane, glabrous, even, slightly viscid, bright rufous-brown, paler when dry, flesh firm, thin, not more than 2 lines thick, everywhere equal, very pale tinge of brown, unchangeable; tubes about 2 lines long, adnate and subdecurrent, openings large, angular, compound, about  $\frac{2}{3}$  mm. diameter, yellow then olive-green; stem 3-5 in. long, about  $\frac{2}{3}$  in. thick, equal, base

attenuated, smooth, rather paler than the pileus, without a ring, solid, flesh with a tinge of brown; spores elongato-fusiform, olive,  $16 \times 4 \mu$ .

Gregarious, but not caespitose. Amongst sphagnum in a swamp. Without any very near ally, probably nearest to slender forms of *Boletus badius*, from which it is at once distinguished by the very thin flesh of the pileus, brighter colour, long slender stem, short tubes, &c.

***Boletus bovinus*. Linn.**

Fasciculate. Pileus 2-3½ in. across, convex then almost plane, margin acute, pale reddish-yellow, glabrous, viscid, shining when dry, with traces of the gluten remaining as fibrils or ridges, flesh rather thin, whitish, unchangeable; tubes subdecurrent, up to ¼ in. deep, openings compound, subangular, often elongated radially, ½-1½ mm. across, dingy yellow, then brownish-cinnamon; stem 2-4 in. long, ½ in. or more thick, equal, even, coloured like pileus, apex often yellow; spores elongato-fusiform, pale olive,  $12-14 \times 5 \mu$ .

*Boletus bovinus*, Linn., Suec., n. 1246; Fries, S. M. i. p. 388; Cke., Hdbk., p. 252.

Heathy fir woods, &c. Pileus rather thin for a *Boletus*, stem thin usually elongated, clustered or gregarious.

Gregarious, fasciculate; pileus 1-2½ in. broad, when young hemispherical, margin white and tomentose, disc and top of stem purplish, base rhubarb-coloured; when full-grown convex, expanded, margin still turned in, very glutinous, dull orange-yellow, or deep buff; flesh tinged with the colour of the pileus, not changeable. Tubes resembling the pores of *Merulius lachrymans*, very shallow (¼ in.), compound, dirty yellow, not easily separating from the pileus. Stem 2-3 in. high, ½-¾ in. thick, subtomentose, not diffused gradually but rather abruptly into the pileus, of the same colour, but streaked with watery lines, attenuated below, or subequal; bulbous when very young. Spores elliptic. Smell strong, like *Marasmius oreades*. (Berk.)

***Boletus granulatus*. Linn.**

Pileus 3-4 in. across, convex, then more or less expanded, at first viscid with reddish-brown gluten, yellowish when the gluten has disappeared; tubes up to ¼ in. long, adnate and often with an indication of being decurrent, yellow,

pores subcircular, simple, with particles of a granulated substance adhering to the dissepiments, about  $\frac{1}{4}$  mm. diameter; stem about 2 in. long,  $\frac{3}{4}$ –1 in. thick, subequal, yellowish, granular with raised points towards the apex, solid, flesh like that of the pileus, pale yellow, unchangeable; spores elongato-fusiform, yellowish,  $12 \times 3\text{--}4 \mu$ .

*Boletus granulatus*, Linn. Suec., n. 1249; Cke., Hdbk., p. 251.

*Boletus lactifluus*, Sowerby, t. 420.

Amongst grass under trees, especially firs. The stem is sometimes thinner above. Allied to *Boletus luteus*, but known by the absence of a ring on the stem.

Gregarious, caespitose. Pileus 2 in. or more broad, hemispherical, at first covered with a rufous-brown slime, afterwards dirty rufous or yellowish; flesh thick, white or yellowish, not changeable; margin at first inflexed and downy. Pores at first whitish, then lemon-coloured, compound, the margin distilling a pale watery milk, which when dried gives them a granulated appearance, at length dirty yellow, adnate. Spores ochraceo-ferruginous; stem 1 in. or more high,  $\frac{1}{2}$  in. thick, generally short, but variable, obtuse at the base, rooting, more watery than the pileus, pale yellow above, white below, minutely tomentose and granulated, at first covered with milky drops. (Berk.)

A very variable species, but the very glutinous pileus always the same colour, viz., a rich chestnut-brown; tubes and stem sulphur-colour, tubes exuding a thin gummy juice, which soon dries in the form of sugary granules. Stem rough, scabrous, as if covered with moist sugar. (W. G. Smith.)

*Boletus tenuipes*. Cooke.

Pileus 1–2 in. across, convex then almost plane, yellowish-brown or gilvous, viscid, streaked with minute fibrils when dry, flesh thick in proportion, white, rosy under the cuticle; pores about  $\frac{1}{4}$  in. long, shortened round the stem, but adnate, openings rather large, angular, yellowish; stem 3–3 $\frac{1}{2}$  in. long,  $\frac{1}{4}$  in. thick, even, attenuated at the base, yellow, solid; spores pale yellow, fusiform,  $10 \times 3 \mu$ .

*Boletus granulatus*, Fr., var. *tenuipes*, Cke., Grev. 1883, p. 43.

*Boletus tenuipes*, Cooke in herb.

In woods and open pastures. Intermediate between *Boletus bovinus* and *B. granulatus*, with some of the features of both, and not readily to be referred to either. The Rev. M. J. Berkeley considers that it approaches most to *B. bovinus*, but the pores are smaller, and the tubes are shortened as they approach the stem. (Cooke.)

Our smallest species of *Boletus*.

***Boletus aurantiporus*. Howse.**

Pileus about 2 in. across, convex then expanded, viscid, at first fulvous-ferruginous, then pale gilvous, squamulose about the margin; tubes deeply decurrent, openings broad angular, edges of dessepiments golden-yellow then orange, turning red when bruised; stem about 3 in. long, equal, beautifully reticulated with yellow and red.

*Boletus aurantiporus*, Howse, in Grevillea, vol. xii. p. 43 (1883).

Under trees. Flesh becoming slightly reddish.

\*\*\*\* *Stem reticulated.*

***Boletus pachypus*. Fr.**

Pileus 4-8 in. across, convex, minutely tomentose, brownish then pale tan, extreme margin incurved when young, flesh very thick, whitish, with very pale tinge of blue when broken; tubes  $\frac{1}{2}$  in. long, shorter round the stem and almost free, openings minute, rounded, pale yellow, tinged with green when old; stem at first short, ovate-bulbous, then elongated and subequal,  $2\frac{1}{2}$ - $3\frac{1}{2}$  in. long, 1 in. or more thick, regularly reticulated, variegated with yellow and crimson, or often entirely crimson, solid; spores narrowly elliptical, pale ochraceous,  $14-15 \times 6 \mu$ .

*Boletus pachypus*, Fries, Syst. Myc. i. p. 390; Cke., Hdbk., p. 256.

In woods. Pileus 6-7 in. broad, pulvinate, sub-tomentose, pale reddish-brown, very thick and fleshy, when young firm, when full grown very soft; flesh white, not changeable; tubes free, at first lemon-coloured, afterwards dirty yellow, simple; stem 3-4 in. high,  $2\frac{1}{2}$  in. thick, bulbous, often swollen from the top, rarely equal, reticulated, yellowish

when young, subrufescent when old, sometimes two or three springing from the same root. (Berk.)

Another large *Boletus* occurs in pastures, under oaks, in August and September, apparently distinct, though nearly allied. I shall therefore give its characters at length, leaving the establishment of it as a species for further consideration. Pileus 10 in. or more across, pulvinate, 2 in. thick, pale ochraceous umber, smooth, but with a satiny appearance from the minute matted silk with which it is clothed, visible only under a lens; sometimes much cracked. Flesh instantly changing from yellow to a beautiful blue, which, however, is very evanescent; towards the edge the flesh scarcely changes at all. Tubes free, but pressed close to the stem, forming an irregular spongy mass an inch thick, pale yellow, blue when bruised. Sporules pale olivaceous ochre. Stem 3 in. high, nearly 3 in. thick, bulbous at the base, generally reticulated only at the very top, but sometimes half-way down, minutely pulverulentosquamulose, of the same colour with the pileus, with a few minute dark flecks, and just where the tubes end a few minute red spots; mottled with blue when cut. Taste like that of a growing walnut. The growth of the tubes is sometimes partially checked, so that while on one side they are 1 in. thick, on the opposite side they are not above  $\frac{1}{4}$  or  $\frac{1}{8}$ . I have found the same plant more than a foot broad, more decidedly tomentose, and of a delicate mouse-grey, and the sides of the pileus remarkably compressed, so as to be parallel with the stem, the flesh not changing uniformly to blue, but becoming beautifully mottled, and the stem bright red near the tubes. (Berkeley, in Eng. Flor., vol. v. p. 151.)

The above form appears to be distinct from *B. pachypus*, neither does it agree with any known species, and although omitted in later works, cannot be ignored, and may possibly occur again.

Stem short, 1-2 in. long, ovate, thick, apex thinner, 1 in. or more thick, firm, distinctly reticulated, lower half red, apex yellow, glabrous, flesh yellowish at the edges, central portion whiter, soon becoming bluish when broken. Pileus convex, brownish-grey, olive, or clay-colour, 2-8 in. broad, compact, rather tomentose, then glabrous, margin subinvolute, soon patent and obtuse. Flesh white, slightly tinged



blue when broken, sometimes almost unchangeable; pores minute, subrotund, bright yellow, whitish when young, becoming blue when touched; tubes rather short, yellow, then greenish. (Fries.)

***Boletus edulis*. Bull.**

Pileus 4-6 in. across, convex, margin obtuse, smooth, moist, brownish becoming paler towards the margin, flesh very thick, white with a slight reddish tinge below the cuticle; tubes up to  $\frac{3}{4}$  in. long, shortened round the stem but not free, openings about  $\frac{1}{2}$  mm. across, simple, sub-angular, at first white then yellow, finally greenish; stem 2-3 in long, stout, ventricose,  $1\frac{1}{2}$ -2 in. at thickest part, very pale brown or buff, upper part with polygonal reticulations formed by thin raised lines, solid; spores greenish-olive, elongato-fusiform,  $14-16 \times 5 \mu$ .

*Boletus edulis*, Bulliard, tab. 60 and 494; Cke., Hdbk., p. 256.

In woods. Esculent. Sometimes three to four spring from the same point. Reticulations on the stem vary in development, but always evident upwards; stem sometimes almost equal, rarely rooting. Flesh unchangeable. Fries says the pileus is sometimes white, greyish with a rufous tinge, &c.

Pileus 6 in. or more broad, pulvinate, at length convexo-expanded, smooth, shining, often rugose, and much cracked, dark umber, paler towards the margin, slightly viscid, extreme margin white, scarcely downy. Flesh turning a little reddish near the epidermis. Tubes nearly free, at first white, then lemon-coloured, at length dull yellow, simple, their orifices angular. Spores large, greenish ochre. Stem 4 in. high or more, 2 in. thick, fawn-coloured, incrassated above and below, reticulated. (Berk.)

I should imagine that the statement by Berkeley, that the stem is *incrassated* above and below, is a slip, and the word *attenuated* intended.

*Var. elephantinus*, changes to blue when cut or bruised. Schaeffer, t. 277.

***Var. laevipes*, Mass.**

Pileus 4-6 in. across, convex, dark brownish-umber,

becoming paler towards the margin, flesh very thick, tinged red under the cuticle; tubes slightly shortened round the stem, but broadly adnate,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, openings subangular,  $\frac{2}{3}$  in. across, whitish, then yellow, finally greenish; stem 3–4 in. long,  $1\frac{1}{2}$ –2 in. or more near the base, slightly attenuated upwards, glabrous and even at every stage of growth, white or with a faint buff tinge towards the apex; spores olive, elongato-fusiform, 15–6  $\mu$ .

In pine woods. The present variety is not uncommon and distinguished from the type by the perfectly even white stem, there being no trace of reticulations at any stage of development.

**Boletus calopus.** Fr.

Pileus 2–4 in. across, convex, minutely tomentose, umber-brown, usually with a strong olive-tinge, flesh thick, margin not involute, soft, yellowish, changing to blue when cut; tubes  $\frac{1}{4}$  in. or more in length, more or less adnate, yellow, when old tinged with green, openings minute, angular,  $\frac{1}{2}$ – $\frac{1}{3}$  mm. across; stem 2–4 in. long,  $\frac{3}{4}$ –1 in. across at thickest part, usually more or less conical, reticulated, apical portion crimson, remainder yellow, or sometimes entirely red, solid; spores elliptic-fusiform, brownish-olive, 10–11  $\times$  3.5  $\mu$ .

*Boletus calopus*, Fries, Syst. Myc. i. p. 390; Cke., Hdbk., p. 255.

In woods, &c. Allied to *Boletus subtomentosus* and *B. chrysenteron*, but readily distinguished by the reticulated stem and the smaller openings of the pores. Pileus not involute at the margin, as in *B. olivaceus*, another ally.

A very beautiful fungus allied to the present species, but much larger, and presenting some remarkable characters, was found by Mr. W. G. Smith. Pileus 7 in. across, convexo-plane, gibbous, smooth and soft like kid leather, yellowish-brown, becoming cracked into areolae, interstices paler; flesh  $1\frac{1}{2}$  in. thick, firm, whitish, tinged red under the cuticle, bright blue when cut; tubes shortened round the stem but not free,  $\frac{3}{4}$  in. long, yellow, green when bruised, openings roundish, small; stem 3 in. long,  $1\frac{1}{2}$  in. thick, equal, attenuated at extreme base, colour of pileus below, stained with red above and then distinctly reticulated, sometimes obscurely reticulated below, solid, flesh deep red at the

base and tinged with red higher up. Taste extremely bitter like gall.

A fine figure of the above, which may prove to be distinct, is in the British Museum collection of drawings of fungi.

***Boletus regius.* Kromb.**

Pileus 3-5 in. across, very convex, almost hemispherical, minutely tomentose, bright rose-pink; flesh very thick, pale yellow, unchangeable; tubes  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, much depressed round the stem, golden-yellow, openings subangular, about  $\frac{1}{2}$  mm. across; stem 2-3 $\frac{1}{2}$  in. long, 1 in. thick, subequal, solid, pale yellow except the base, which is dingy purple, vaguely reticulated or with minute squamules; spores elongate-fusiform, pale yellow,  $16 \times 5 \mu$ .

*Boletus regius*, Krombholtz, t. 7; Fries, Hym. Eur., p. 508.

On the ground in open places, &c. A very beautiful species, either solitary or in small clusters. The British specimens differ from Fries' description, which says that the pileus is glabrous and the tubes short, but this description is drawn up from Krombholtz's figure.

***Boletus crassus.* Mass. (n. sp.)**

Pileus 3-5 in. across, convex then expanded, often irregularly waved or nodulose, densely tomentose, tomentum collected in little fascicles, sometimes cracked in an areolate manner, flesh thick up to the margin,  $\frac{1}{2}$ - $\frac{3}{4}$  in. or more, firm, for a long time white, then pale primrose-yellow, colour of pileus rather pale yellow-brown; tubes short at first, eventually  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, shortened round the stem and nearly or quite free, openings irregularly rounded, generally simple, about  $\frac{1}{2}$  mm. across, for a long time white, then bright but pale primrose-yellow; stem at first almost globose, at length becoming a little elongated, about 2 in. long, and nearly as thick, slightly attenuated at the apex, a little paler than the pileus above, becoming almost white towards the base, glabrous, upper portion with conspicuous raised white lines arranged to form a more or less regular polygonal network, solid; flesh white when young, becoming pale yellow with age; spores elliptic-fusiform, pale yellow,  $10 \times 3 \mu$ .

In woods and under trees in pastures, &c. The pure white flesh of young specimens becomes pale primrose-yellow when cut or broken and exposed to the air; smell strong, acid, taste sweet and nutty.

Allied to *Boletus impolitus*, but distinguished by the undulated, yellow-brown pileus, glabrous, conspicuously reticulated stem, and clear pale primrose-yellow flesh. The subglobose stem is also characteristic. There is no tinge of blue about the flesh at any age. *Boletus pachypus* differs from the present species in the stem, which is at first subglobose, becoming elongated and subequal, the greenish pores, and the larger spores.

***Boletus collinitus*. Fr.**

Pileus 3-4 in. across, convex then expanded, smooth, even, at first covered with brown gluten, which eventually disappears, leaving the pileus pale, flesh white; tubes adnate,  $\frac{1}{4}$  in. or more in length, openings rather large, mostly divided in two, pallid then yellow, naked; stem 2-3 in. long, up to 1 in. thick at the apex, attenuated downwards, firm, without trace of a ring, whitish becoming tinged with brown, more or less covered with adpressed scales that give to it a reticulated appearance.

*Boletus collinitus*, Fries, *Epicrisis*, p. 410; Stev., *Brit. Fung.*, p. 169.

In fir woods. Solitary. Stature and colour of *Boletus luteus*, but without a trace of a ring on the stem at any age. A rare species, of which no figure exists; Fries says that Krombholtz, t. 76, figs. 10, 11, are allied, but the tubes are green.

**B. *Openings of tubes red*.**

***Boletus satanus*. Lenz.**

Pileus 4-8 in. across, convex, soft, glabrous, slightly viscid, whitish or pale buff, flesh very thick, becoming at first reddish when broken, then bluish or violet; tubes rather short, free from the stem, yellow, openings minute, edges of the dissepiments from the first blood-red, becoming orange when old; stem very stout ovato-ventricose, 2-3 in. long, and almost as wide at the thickest part, whitish or pale dingy

yellow with blood-red reticulations above, solid; spores brownish, elliptic-fusiform,  $11-13 \times 4-5 \mu$ .

*Boletus satanas*, Lenz., f. :31; Fries, Hym. Eur., p. 510, Hussey, vol. i. t. 7; Cke., Hdbk., p. 258; Stev., Brit. Fung., p. 177.

In woods. Pileus variable in colour, but always pale, commonly whitish, tinged buff, yellow, or pink, often irregular and wavy. Very showy, smell and taste pleasant, but very poisonous. Known by the very stout, broadly fusiform stem having red reticulations at the apex, the blood-red mouths of the pores and the pale pileus.

Pileus sometimes 8 in. across; commonly less, pulvinate, soft to the touch, naked, dry, smooth, whitish, leather-buff, or greenish, often shading into a red tinge; flesh solid, becoming soft, tender, and juicy, white, turning reddish, then blue; stem 2-3 in. high, thick, finely reticulated above, the reticulations purple-crimson, often vanishing in age, the stem growing streaked below. (Cooke.)

#### *Boletus luridus*. Schaeff.

Pileus 3-6 in. across, convex, minutely tomentose, colour variable, generally dingy brown with an olive tinge, rather viscid when moist, flesh very thick, firm, and like that of the stem, yellow, becoming indigo-blue at once when broken; tubes  $\frac{1}{4}-\frac{1}{2}$  in. long, shortened round the stem and almost or quite free, greenish-olive, openings roundish, about  $\frac{1}{3}$  mm. across, edges of dissepiments vermilion, orange, or reddish-brown; stem usually almost globose when young, afterwards remaining bulbous or becoming ventricose and elongated, vermilion or yellow with red blotches, sometimes vaguely reticulated with red lines; spores yellowish, oblong-fusiform,  $12 \times 4 \mu$ .

*Boletus luridus*, Schaeffer, t. 107; Cke., Hdbk., p. 258.

In woods and under trees in pastures. Whole plant hard and firm; the yellow flesh changes at once to indigo blue when broken in contact with the air, the blue colour soon fades, leaving the flesh a permanent dirty yellow. Every part becomes blackish when bruised.

The stem is not distinctly reticulated by raised lines as in several species, but the darker markings take at times a more or less netted arrangement.

in Kew Gardens in Oct., 1886. The  
occurred.

measured 3-4 in. across, convex, then depressed,  
fleshmentose, then broken up into minute squa-  
res, thick nearly up to the margin, yellow,  
wounded when cut; tubes free, convex,  $\frac{1}{2}$  in.  
long, carmine for some distance, changing to  
white where they join the pileus, openings angular, com-  
monly across; stem about  $1\frac{1}{2}$  in. long, obconic,  
tapering to a point, yellow, streaked  
with carmine, solid, flesh yellow; spores yellow-  
siform,  $9 \times 4 \mu$ .

*Tubes pinkish throughout their length.*

*Pileus.* Bull.

3-4 in. across, convex then expanded, soft, even,  
pinkish-red, foxy, or chestnut, flesh thick, white,  
becoming flesh-colour when broken; tubes adnate but  
not round the stem,  $\frac{2}{3}$  in. deep, pale flesh-colour,  
when bruised, openings irregularly angular, up to  
the margin; stem  $2\frac{1}{2}$ -3 in. long,  $1\frac{1}{2}$  in. at the base, thinner  
towards the apex, dingy yellow or olive, reticulate with raised lines,  
flesh pale flesh-colour, elongato-elliptic,  $16-19 \times 4-$

*Pileus*, Bull., t. 379; Cke., Hdbk., p. 260.

marked by the pale pinkish pores and spores, and by  
the flesh becoming pink when cut. Taste bitter.

is the most beautiful of species, solitary, stem naked,  
most straight, 2-4 in. long, glabrous, reticulated,  
or incrassated at the base,  $\frac{1}{3}$ -1 in. thick, in our  
specimens smoky-olive, white within, towards the apex often  
very pale rose-colour when wounded. Pileus fleshy,  
when young, then becoming almost plane, pale chest-  
nut-coloured, very glabrous, even,  $1\frac{1}{2}$ -4 in. broad, flesh  
when tinged with dilute rose-colour, very soft and  
margin obtuse. Tubes very long, soft, straight,  
rosy-white. Pores subrotund, regular, rosy-white, often  
becoming dingy when touched. (Fries.)

*Boletus purpureus*, Fries, Bol., p. 11; Hym. Eur., p. 511; Cke., Hdbk., p. 258.

In woods. Distinguished by the deep purple-red pileus and the purple or orange-red openings of the tubes. Fries says that the apex of the stem is sometimes reticulated. Distinguished from *Boletus purpurascens* by the red or purple mouths of the tubes. A very fine form of the present species was collected at Morpeth in Cumberland, presenting the following characters:—Pileus 4 in. across, convex then plane, rather flexuous, margin slightly exceeding the tubes and incurved, very minutely tomentose, reddish-purple, flesh about  $\frac{1}{4}$  in. thick, thinner towards the margin, yellow, unchangeable; tubes free from the stem, ventricose,  $\frac{1}{2}$  in. long, yellowish-olive, becoming blue when cut, openings irregular, circular and about  $\frac{1}{2}$  mm. across, or elongated up to 1 mm., edges of dissepiments deep orange; stem 3 in. long, equal, but attenuated at extreme base, ground yellow, but densely covered with purple spots and lines, solid, flesh yellow above, becoming blue when cut, deep purple downwards; spores olive, elliptical,  $9 \times 5 \mu$ .

C. *Tubes red throughout their length.*

*Boletus rubinus*. W. G. Smith.

Pileus 2-3 in. across, gibbous, convex, when old often nearly plane, dry, minutely tomentose, often slightly cracked, pale yellow-brown; tubes subdecurrent, about  $\frac{1}{4}$  in. long, wholly clear carmine, openings subangular, compound, about  $\frac{1}{2}$  mm. diameter; stem  $1\frac{1}{2}$ -3 in. long,  $\frac{1}{4}$ - $\frac{3}{8}$  in. thick, solid, yellow more or less streaked or smeared with carmine, or sometimes entirely red, flesh, like that of the pileus, clear yellow, unchangeable; spores pale yellow-brown, elliptical  $6 \times 4 \mu$ .

*Boletus rubinus*, W. G. Smith, in Seeman's Journ., 1868, p. 33, t. 75, f. 1-4; Cke., Hdbk., p. 253.

On the ground under trees. It differs from all other British species in the wholly carmine tubes, together with the vivid yellow, wholly unchangeable flesh.

A larger form or variety of this species occurred plentifully

under beech-trees in Kew Gardens in Oct., 1886. The typical form also occurred.

The variety measured 3-4 in. across, convex, then depressed, yellow-brown, tomentose, then broken up into minute squamules, flesh  $\frac{3}{4}$  in. thick nearly up to the margin, yellow, becoming rose-coloured when cut; tubes free, convex,  $\frac{1}{2}$  in. long where longest, carmine for some distance, changing to olive where the tubes join the pileus, openings angular, compound, about  $\frac{1}{2}$  mm. across; stem about  $1\frac{1}{2}$  in. long, obconic,  $1\frac{1}{2}$  in. across at the apex, tapering to a point, yellow, streaked and spotted with carmine, solid, flesh yellow; spores yellow-brown, elliptic-fusiform,  $9 \times 4 \mu$ .

*D. Tubes pinkish throughout their length.*

***Boletus felleus.* Bull.**

Pileus 3-4 in. across, convex then expanded, soft, even, glabrous, yellowish-red, foxy, or chestnut, flesh thick, white, becoming dingy flesh-colour when broken; tubes adnate but rather shortened round the stem,  $\frac{2}{3}$  in. deep, pale flesh-colour, darker when bruised, openings irregularly angular, up to 1 mm. across; stem  $2\frac{1}{2}$ -3 in. long,  $1\frac{1}{2}$  in. at the base, thinner upwards, dingy yellow or olive, reticulate with raised lines, solid; spores pale flesh-colour, elongato-elliptic,  $16-19 \times 4-5 \mu$ .

*Boletus felleus*, Bull., t. 379; Cke., Hdbk., p. 260.

Distinguished by the pale pinkish pores and spores, and by the white flesh becoming pink when cut. Taste bitter.

Amongst the most beautiful of species, solitary, stem naked, fleshy, almost straight, 2-4 in. long, glabrous, reticulated, subequal, or incrassated at the base,  $\frac{1}{3}$ -1 in. thick, in our specimens smoky-olive, white within, towards the apex often greenish, very pale rose-colour when wounded. Pileus fleshy, convex when young, then becoming almost plane, pale chestnut or fulvous, very glabrous, even,  $1\frac{1}{2}$ -4 in. broad, flesh white then tinged with dilute rose-colour, very soft and spongy, margin obtuse. Tubes very long, soft, straight, often rosy-white. Pores subrotund, regular, rosy-white, often becoming dingy when touched. (Fries.)



E. *Tubes and openings of pores white or grey, sometimes becoming brownish.*

**Boletus laricinus.** Berk.

Pileus 2-3 in. across, convex, dirty white with livid or greenish stains, covered at first with dirty yellow or brownish evanescent slime, usually with a few squamules near the margin, flesh white, unchangeable; tubes subdecurrent, about  $\frac{1}{4}$  in. long, openings angular, compound, about  $\frac{1}{4}$  mm. diameter, white then dingy olive-brown; stem 1-2 in. long,  $\frac{1}{2}$  in. or more thick, ringed, dirty white, reticulated above the ring, often hollow towards the base; spores dirty olive-brown, fusiform,  $11-14 \times 4 \mu$ .

*Boletus laricinus*, Berk., Outl., p. 230: Cke., Hdbk., p. 251.

On the ground under larches, &c. Pileus 2-3 in. broad, dirty white, with livid stains, and sometimes adpressed, dirty yellow fascicles of filaments, the remains of the slimy ring; often deeply scrobiculate, covered with dirty yellow or brownish slime, which gradually disappears. Flesh white, very slightly tinged with yellow, not changeable. Tubes adnate or subdecurrent, compound, each consisting of two or three cells, their orifices angular, at first dirty white, with a tinge of yellow, at length brownish from the spores. Stem 2 in. or more high,  $\frac{1}{2}-\frac{3}{4}$  in. thick, nearly equal, reticulated above the ring, and frequently much scrobiculated below, dirty white like the pileus, stained with the spores, somewhat downy at the base. Spores oblong, brownish clay-coloured. (Berk.)

**Boletus rubiginosus.** Fr.

Pileus 2-5 in. broad, convex, rather soft, pubescent, soon becoming glabrous, reddish-brown, flesh thick, white, unchangeable; tubes adnate, very slightly or not at all shortened round the stem, openings angular, unequal, about  $\frac{1}{4}$  mm. diameter, white, unchangeable; stem 2-3 in. long, about 1 in. thick, thinner upwards, everywhere covered with prominent thin ridges arranged in a reticulated manner, solid, whitish, then more or less tinged with yellow; spores colourless, elongato-fusiform,  $12 \times 4 \mu$ .

*Boletus rubiginosus*, Fries, Obs. Myc. ii. p. 245; Fries, Hym. Eur., p. 521.

On the ground in beech woods.

Scattered. Stem 2-3 in. long, almost 1 in. thick, attenuated upwards, firm, glabrous, solid, very distinctly reticulated, whitish when young, then yellowish, becoming slightly greyish or yellowish-olive when bruised. Pileus pulvinate, 2-4 in. broad, pubescent when young, soon becoming very glabrous, dry, foxy-brown with a reddish tinge, in young specimens the margin is acutely incurved, then becoming patent and obtuse; under surface concave when young, then plane. Tubes short, straight, white, shorter than the thickness of the soft, spongy, white, unchangeable flesh. Pores variable, subrotund or unequal, elongated or not longer than broad, white, unchangeable. (Fries.)

A specimen agreeing admirably with the above detailed description by Fries, was collected in a beech wood in the New Forest. The species appears to be very rare everywhere, and was only once collected by Fries in 1815. Distinguished at once by the dark reddish-brown, glabrous pileus, white tubes, and beautifully reticulated pale stem. There is no tinge of blue at any part when cut or broken.

***Boletus viscidus.* Linn.**

Pileus 3-4 in. across, convex, soft, smooth, viscid, pale dingy yellowish or pale buff, often with greenish stains, flesh thick, white, unchangeable, margin of pileus acute, often with fragments of the veil attached; tubes about  $\frac{1}{2}$  in. long, adnate, openings large, unequal, more or less radially elongated, pale grey then brownish; stem 2-3 in. long,  $\frac{1}{2}$  in. thick, viscid, pale yellow, vaguely reticulated upwards, and with fragments of the veil adhering here and there, subequal or thickened at the base, ring imperfect, solid, flesh yellow at the base; spores subfusiform, brownish-green,  $9-10 \times 3 \mu$ .

*Boletus viscidus*, Linn., Suec., n. 1248; Cke., Hdbk., p. 259.

In woods. Closely allied to *Boletus laricinus*, Berk., but distinguished by the yellow tone of pileus and stem, also by the large openings to the pores, which are radially elongated, and by the smaller spores.

***Boletus scaber.* Fries.**

Pileus 3-6 in. across, very convex, smooth, even, viscid when moist, at length more or less rugulose and often

minutely granulated, owing to the breaking up of the cuticle, colour variable, whitish, brown, ochraceous-orange, &c.; flesh thick in the centre, thin towards the margin, white, unchangeable; tubes  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, shorter round the stem and almost free, openings subangular, compound, irregular  $\frac{1}{2}$ –1 mm. across, white then dingy brownish-olive; stem 5–7 in. high, 1–1 $\frac{1}{2}$  thick at the base, conical, pale, rough with dark fibrous squamules that become larger downwards, solid; spores dingy olive-brown, elongato-fusiform, 18–20  $\times$  5  $\mu$ .

*Boletus scaber*, Fries, Syst. Myc. i. p. 293; Cke., Hdbk., p. 259.

In woods. Esculent, and good flavour. Distinguished by the conical scabrid stem, white, unchangeable flesh, and the pores first white, then dingy.

Pileus 3–7 in. or more broad, pulvinate, viscid when moist, very variable in colour, white, cinereous, brown olive, deep orange, or vermilion, smooth or minutely downy, the down sometimes collected into minute fasciculate scales; flesh very thick, soft, not changeable in young specimens, in older ones reddish-grey when bruised, and sometimes black; tubes white, pulvinate, stained with the yellow-brown spores, their orifices often ferruginous before the expansion of the pileus, minute, round; stem 6 in. or more high, attenuated upwards, squarrose with black or orange scales, sometimes marked with coarse raised lines. At first the stem is ovate and the pileus very narrow. There are frequent traces of a floccose veil. (Berk.)

#### ***Boletus niveus*. Fr.**

Pileus 3–5 in. across, very convex, even, glabrous, pure white when young, and either remaining so, or becoming more or less tinged with green; flesh white, very thick, becoming greyish when broken; tubes shortened round the stem but not entirely free,  $\frac{1}{2}$ – $\frac{3}{4}$  in. or more in length, whitish, becoming tinged with grey, openings rounded, small, about  $\frac{1}{2}$  mm. across; stem 3–6 in. long, 1 in. or more thick at the base, becoming gradually attenuated upwards, whitish, becoming grey when bruised, more or less rough with white squamules, or wart-like elevations, solid; spores colourless, elliptical, 9–10  $\times$  5  $\mu$ .

*Boletus niveus*, Fries, Obs. Myc. i. p. 111.

*Boletus scaber*, var. *niveus*, Fries, Hym. Eur., p. 516.

On the ground in woods. The present species, as shown by the synonymy, was first described as a distinct species by Fries, and later was considered by the same authority as a variety of *Boletus scaber*. During the annual fungus foray of the Windsor and Eton Scientific Society, held at Burnham Beeches in October, 1891, the present species was found in abundance, and although the general form, size, and conical stem suggest *B. scaber*, nevertheless I am inclined to accept the first determination of Fries, and consider the present as a distinct species, known from *B. scaber* by the white pileus usually becoming more or less green with age, the small adnate and persistent wart-like squamules on the stem, the tendency of every part to become greyish when bruised, and more especially by the broadly elliptical colourless spores, which are very unusual in the genus.

Subgregarious. Stem solid, elongated, 3-5 in. long, whitish, becoming considerably attenuated upwards, scabrous, with white squamules or rough points arranged somewhat in a reticulate manner, greyish when handled, base with white tomentum, not bulbous. Pileus pulvinate, convex, fleshy, soft, even, glabrous, white, becoming greenish, 2 in. broad, margin patent, even, hymenium plane. Flesh very soft, white, grey when touched with the fingers. Tubes white with a greyish tinge, longer than thickness of flesh of pileus. Pores white, minute, rounded. (Fries.)

***Boletus versipellis*. Fr.**

Pileus 3-5 in. across, convex, dry, at first tomentose, then minutely squamulose, eventually often smooth, often furnished at the margin with fragments of the membranaceous veil, flesh thick, unchangeable; tubes free, rarely exceeding  $\frac{1}{2}$  in. in length, white, plane, openings minute, edges of dissepiments grey; stem 4-5 in. long,  $1\frac{1}{2}$ -2 in. thick at the base, attenuated upwards, ruguloso-squamulose, whitish or tinged with pale buff, yellow or pink, solid.

*Boletus versipellis*, Fries, Bolet. p. 13, Stev., Brit. Fung., p. 179.

In woods and amongst heather, &c.

Distinct from *Boletus scaber*, but on account of agreement in

variations of colour and stature, difficult to define. In the present species the colour is more constantly rufous. (Fries.)

Pileus of a beautiful orange, spores spindle-shaped, pale ochraceous,  $14-15 \times 6 \mu$ . (Cooke.)

In Krombholtz, tab. 32, quoted by Fries under the present species, the colour of the pileus is shown as umber, reddish-brown, rufous, blood-red, orange, and yellow.

***Boletus alutarius*. Fr.**

Pileus convex then expanded, soft, velvety becoming glabrous, brownish-tan; tubes short, depressed round the stem, plane, openings round, white, becoming brownish when bruised; stem solid, almost smooth, bulbous, apex rugulose.

*Boletus alutarius*, Fries, Obs. i. p. 115; Stev., Brit. Fung., p. 180.

In woodland pastures.

Closely allied to *Boletus felleus*, but readily known by the almost unchangeable flesh and mild taste. (Fries.)

***Boletus porphyrosporus*. Fr.**

Pileus 4-6 in. across, convex then expanded, minutely velvety, dark olive or brownish-umber, becoming blackish when bruised, flesh up to 1 in. thick, white, becoming blue near the tubes when cut; tubes  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, slightly shortened close to the stem, semiadnate, openings angular,  $\frac{3}{4}$ -1 mm. wide, grey, then pale brown, becoming umber when bruised; stem 4-5 in. long, 1 in. or more thick, equal or usually more or less thicker towards the base, dirty greyish-umber or brownish with ochraceous tinge, minutely punctate; spores brownish-purple, elongato-fusiform,  $13-14 \times 4 \mu$ .

*Boletus porphyrosporus*, Fries, Bolet., No. 36; Fries, Hym. Eur., p. 514; Kalchbr., Icon. Sel. Hym. Hung., p. 51, tab. xxxii. fig. 1.

In woods and open grassy places under trees. Solitary or in tufts of few individuals. Smell strong, fishy according to Kalchbrenner's idea. A large fine species distinguished at once by the purple spores. Stem curved and ascending at times.

*Subgen. GYRODON. Ohatowski.*

Pores sinuous or gyroso-plicate, tubes very short, scarcely 1 line long, subadnate with the sporophore.

***Boletus (Gyrodon) caespitosus. Mass. (n. sp.)***

Densely fasciculate, stems more or less connate at the base. Pileus 1-2 in. across, hemispherical, margin usually wavy, acute, disc olivaceous-umber, becoming paler towards the margin, which is pale pink, tomentose, dry; flesh thick,  $\frac{3}{4}$  in. in large specimens, firm, yellow like that of the stem, and instantly changing to intense blue when cut or broken, this colour soon fades to a dirty white, then becomes rufous; tubes about  $\frac{1}{2}$  line long, openings very irregular, elongated, sinuous, yellow; stem  $1\frac{1}{2}$ -2 in. long,  $\frac{3}{4}$  in. thick in the larger specimens, thinner at the extreme apex, even, glabrous, yellow except at the base, which is dingy red, solid, flesh dingy red at the base; spores narrowly elliptical, pale olive,  $12 \times 4 \mu$ .

Amongst grass under trees. Distinguished by the caespitose habit, 8-12 in a cluster, and the very short tubes with sinuous openings.

**AGARICINEAE.**

The Hymenomycetous type of structure attains its maximum of development in certain of the members of the present group, characterised more especially by having the hymenium spread over radiating gills or lamellae.

In the most highly evolved forms the entire fungus when young is enclosed in a primary or *universal veil* which is ruptured during the elongation of the stem, the lower portion remaining attached to, and sheathing the base of the stem, and known as the *volva*. The *volva* may be more or less free and readily separable, or entirely *adnate* or grown to the substance of the stem. The upper portion that is carried up on the pileus is torn into patches or warts as the pileus expands. A *secondary* or *partial veil* is also present in some species, spreading as a thin membrane from the upper part of the stem to the margin of the pileus; as the pileus expands the veil breaks away from its margin and remains on the stem as a frill-like *ring*. In some species both universal and secondary veils are present, in others the universal veil only, whereas in others the secondary veil alone is present; finally there are numerous species not possessing a trace of either universal or secondary veil.

In the great majority of species the stem is *central*, but in some species it grows from the margin of the pileus, and is said to be *lateral*; in others again it is entirely absent, when the pileus is described as *sessile*, and is either attached by a broad base and stands out horizontally, when it is *dimidiate*, or is attached by the pileus to the wood or bark on which it is growing, hence the gills are uppermost, and exposed to the light, in which case it is described as *resupinate*.

The most important feature in the discrimination of genera turns on the mode of attachment of the gills to the stem. When the gills are attached or grown to the stem, and run down the latter for some distance, they are said to be *decurrent*. The opposite extreme to the last-named

condition is when the gills are rounded off behind (= nearest to the stem), and do not touch the stem, when they are said to be *free*. Between the two extreme modes of attachment already described, transitional stages exist; when the gills reach the stem and grow to it without being either decurrent or narrowed at the point of attachment, they are said to be *adnate*. When the gills are attached to the stem, but not by their whole width, in other words when the gill is more or less narrowed at the point of contact with the stem, the term *adnexed* is used; finally, when the adnexed type of attachment has the narrowed part of the gill close to the stem cut away in a curved manner so as to leave an evident channel between the gills and the stem, the term *sinuate* is used.

The primary divisions of the Agaricineae are founded on the colour of the spores, and while admitting that this is a purely artificial arrangement, it is certainly a very convenient and practical one, and in a purely systematic work, where the primary object is to enable the student to determine the name of a given species—a necessary preliminary to morphological or physiological work—is admissible.

The large genus *Agaricus*, as understood by Fries, is broken up by that author into several subgenera; in the present work all the Friesian subgenera of *Agaricus* are elevated to generic rank, for the two following reasons: (1) Many genera included in the Agaricineae by Fries, as *Cortinarius*, *Paxillus*, &c., are quite as closely allied, or even more so, than the Friesian subgenera of *Agaricus* are to each other. (2) In describing a species of *Agaricus* from the Friesian standpoint it is necessary to include the subgeneric name in brackets thus:—*Agaricus (Psalliota) campestris*; this unnecessarily long name is reduced by raising the subgenera of Fries to generic rank, and as a genus is not stereotyped in nature as such, more good than harm is effected by the change, except to those minds who consider every departure from accepted custom as retrograde.

#### AGARICINEAE.

Hymenium borne on lamellae, situated on the under surface of the sporophore, rarely in the simpler types on the upper surface, and consequently turned to the light.



Lamellae radiating from the centre or from a lateral point, simple or forked, rarely irregularly anastomosing, often connected transversely by thin ridge-like ribs or veins. Basidia normally tetrasporous, cystidia often present in the hymenium. Spores continuous, colourless or coloured.

The great majority of species are fleshy, and soon decay; others, however, are tough, coriaceous, or woody and persistent.

### ANALYSIS OF SECTIONS.

#### I. MELANOSPORAE.

Spores black. The gills black or dark grey and speckled with the black spores. No tinge of purple at maturity.

#### II. PORPHYROSPORAE.

Spores purple-black. Gills black or brown, with a purple tinge at maturity.

#### III. OCHROSPORAE.

Spores ochraceous, bright brown or bright rust-colour. Gills at maturity dingy ochraceous, brownish or bright ferruginous, no tinge of purple present.

#### IV. RHODOSPORAE.

Spores salmon-colour or pink. Gills salmon-colour or rosy at maturity; the colour in some species is very pale, and liable to be mistaken for members of the *Leucosporae*, unless attention is paid to the colour of the spores in the mass. In some of the *Porphyrosporae* the gills are pale rose at an early stage of development, but become dark purple later.

#### V. LEUCOSPORAE.

Spores white. Gills in most species white at maturity; in many species, however, the gills are from the first, or at some stage of development, grey, yellow, rusty, &c., but these tints are not due, as in the other sections, to the

colour of the spores. When a doubtful specimen presents itself, the only certain method is to examine the spores microscopically, and also in the mass as thrown down on paper.

In the genus *Russula*, included in the *Leucosporae*, the spores are in some species pure white, in others cream-colour, and in several clear pale ochraceous.

Finally, in numerous species of *Cortinarius* the gills are deep purple during certain stages of development, but this colour is never present in the spores.

The spores can be obtained in the mass, and the colour seen by the naked eye, if the stem is cut off close to the gills, and the pileus placed gills downwards on paper and allowed to remain for a few hours. If the species is presumably a dark-spored one, use white paper; if pink or white spored, use black paper.

#### MELANOSPORAE.

The present section includes five genera characterised by having black spores, as seen in the mass and on a white ground; under such circumstances there is no tinge of purple or brown. Seen under the microscope by transmitted light the spores are in some species black and opaque, in others subtranslucent and often of a sooty-brown colour. The flesh of the pileus is usually thin and often membranaceous. In the genus *Coprinus* the gills are, during the young stage, closely pressed together like the leaves of a book; cystidia are commonly present, and when the spores are mature the whole structure of the gills deliquesces and drips away, charged with the black spores in the form of an inky fluid.

In the genera *Panaeolus*, *Anellaria*, and *Psathyrella*, the gills are free from each other laterally, and persistent, frequently dark grey and variegated with the black spores.

The species, as a rule, are long-stemmed, and with a cylindrical or campanulate thin pileus that often eventually becomes expanded, and in many species is deeply sulcate or grooved.

The atomate appearance of the pileus so characteristic of

many species of the present group, is due to the presence of myriads of very minute, glistening crystals of oxalate of lime.

Many of the species grow on dung or in richly-manured ground, a few occur on decaying trunks.

The deliquescence of the gills in *Coprinus* has its equivalent in the deliquescence of the trama and hymenial elements, basidia, &c., in the *Gastromycetes*.

The genus *Gomphidius* is placed with the present group on purely technical grounds, and presents no affinity whatever with any other genus included in the section. But this remark is equally true of the genera included in any other group, *Gomphidius* not suggesting close affinity with any known genus. Fries considers that the habit suggests a position intermediate between *Cortinarius* and *Hygrophorus*.

The spores in the present genus are not truly black, as in the remainder of the *Melanosporae*, but more or less olive with a smoky-black tinge, and are very large and fusiform or spindle-shaped, as in the genus *Boletus*.

### ANALYSIS OF THE GENERA.

#### MELANOSPORAE.

\* Gills at first cohering laterally, soon deliquescing, not decurrent.

#### *Coprinus*.

\*\* Gills distinct, not deliquescent nor decurrent.

† Pileus not striate.

*Anellaria*.—Stem with a ring.

*Panaeolus*.—Stem without a ring.

†† Pileus striate.

#### *Psathyrella*.

\*\*\* Gills decurrent, subgelatinous.

#### *Gomphidius*.



#### FIGURES ILLUSTRATING THE MELANOSPORAE.

Fig. 1, *Coprinus comatus*, showing the scaly, cylindrical pileus, and the loose ring that has slipped down the stem; about  $\frac{1}{2}$  nat. size;—Fig. 2, *Anellaria separata*, a rather small specimen; nat. size;—Fig. 3, *Panaeolus retirugis*, basidium and spores; highly mag.;—Fig. 4, *Psathyrella disseminata*, group of plants; nat. size;—Fig. 5, *Anellaria separata*, section of portion of pileus, showing the adnate or fixed gills, also the margin of the pileus extending beyond the gills; nat. size;—Fig. 6, *Coprinus narcoticus*, group of plants about  $\frac{1}{2}$  nat. size;—Fig. 7, *Gomphidius viscidus*, entire specimen; about  $\frac{1}{2}$  nat. size;—Fig. 8, section of pileus of same, showing the decurrent gills;  $\frac{1}{2}$  nat. size;—Fig. 9, basidium and spores of same; highly mag.;—Fig. 10, *Coprinus atramentarius*, portion of hymenium, showing a basidium bearing four coloured spores, several paraphyses, and a large cystidium; highly mag.;—Fig. 11, *Coprinus fimetarius*, pileus in an advanced stage of development, with the margin revolute, and the gills deliquescing into a black inky fluid;  $\frac{1}{2}$  nat. size;—Fig. 12, *Coprinus congregatus*, a small group of fungi; nat. size;—Fig. 13, *Coprinus Spraguei*, spores; highly mag.;—Fig. 14, *Psathyrella arata*, portion of pileus, showing the deeply sulcate margin; about  $\frac{1}{2}$  nat. size;—Fig. 15, *Coprinus platypus*, two specimens showing the discoid base of the stem; mag. 3 times.

## COPRINUS. Pers. (figs. 1, 6, 10-13, 15, p. 303).

Pileus stipitate, flesh very thin or even quite membranaceous, veil generally universal, sometimes forming an adnate volva round the base of the stem, and furnished with a free border, usually floccose or scurfy on the expanded pileus; gills at first closely in contact laterally, eventually deliquescing into a fluid coloured black by the spores; stem usually hollow; spores black at maturity.

*Coprinus*, Pers., Syn., in part; Fries, Epic., p. 241; Fries, Hym. Eur., p. 320; Cke., Hdbk., p. 224.

A very distinct and natural genus, and sharply defined, more especially by the peculiarities of the gills or lamellae, which are at first closely coherent laterally, being apparently agglutinated, but eventually becoming separate and free from each other, and by becoming at maturity resolved into a black inky fluid; most of the species are very ephemeral, the sporophore in many springing up, attaining maturity, and completely disappearing again within twenty-four hours. Cystidia of large size are present in large numbers in the hymenium of many species.

The majority of species grow on dung or on richly manured ground, but a few also occur on rotten wood, damp carpets, walls, &c.

In the Ochrosporae, the genus *Bolbitius* agrees with *Coprinus* in the ephemeral existence of the species, in the soft, deliquescent gills, and also in most frequently growing on dung or in places where dung abounds.

## ANALYSIS OF THE SPECIES OF COPRINUS.

Tribe I. *Pelliculosi*.—Gills covered with a distinct fleshy or membranaceous cuticle, therefore the pileus does not split along the lines of the gills, but becomes lacerated and revolute.

\* *Comati*.—Ring formed from the free margin of the volva; cuticle torn into scales.

\*\* *Atramentarii*.—With an imperfect ring (not volvate), squamules of pileus, minute, innate.

\*\*\* *Picacei*.—Universal veil flocculose, at first continuous, then torn into superficial, areolate patches by the expansion of the pileus.

\*\*\*\* *Tomentosi*.—Pileus at first veiled by a loosely villous web that becomes torn into distinct floccose scales, which eventually disappear. Ring absent.

\*\*\*\*\* *Micacei*.—Pileus at first covered with minute glistening micaceous squamules or granules, which at length disappear. Ring absent.

\*\*\*\*\* *Glabrati*.—Pileus glabrous, without either floccose or micaceous squamules. Veil absent.

Tribe II. *Velliformes*.—Pileus very thin, without a cuticle, plicato-sulcate, at length splitting along the lines of the gills. Stem slender, hollow.

\* *Cyclodei*.—Stem furnished with a ring that is in some species the free margin of the volva.

\*\* *Lanulati*.—Gills free, pileus with a superficial flocculose layer that eventually disappears. Ring absent.

\*\*\* *Furfurelli*.—Pileus micaceous or scurfy; gills usually adnate to a collar at the apex of the stem. Ring absent.

\*\*\*\* *Hemerobii*.—Pileus always glabrous. Ring absent.

#### TRIBE I.—PELLICULOSI.

##### \* *Comati*.

*Coprinus comatus*. Fr. (fig. 1, p. 303.)

Pileus 3-4 in. high, cylindrical, then more or less expanded, at first even, during growth the cuticle becomes torn into broad, adpressed, scattered scales, pale ochraceous, interstices whitish; gills almost free, about  $\frac{1}{2}$  in. broad, crowded, white, then pinkish, at length black; stem 4-6 in. long,  $\frac{1}{2}$ - $\frac{3}{4}$  in. thick, subequal or slightly attenuated upwards, white, even, hollow, more or less bulbous, bulb solid, ring movable; spores almost black, elliptical,  $13-18 \times 7-8 \mu$ .

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*Coprinus comatus*, Fries, *Epier.*, p. 242; Cke., *Hdbk.*, p. 224; Cke., *Illus.*, pl. 658.

Amongst grass. Esculent. A very distinct species; *Coprinus ovatus*, its nearest ally, is with us a rare species, distinguished by its smaller size, striate margin of the pileus, and large, concentrically arranged scales on the pileus.

Large, gregarious, not tufted. Pileus when young oblongo-cylindrical, at length conic-campanulate, 3-6 in. from the base to the apex, white, the summit tinged with brown, and the surface more or less covered with large shaggy scales. As the plant grows old, the white colour gives place to a shade of reddish-brown, and the lower part becomes so thin that the lamellae are seen through its substance, of a dull orange colour. Lamella free, contiguous to each other, white, at length reddish-purple, in decay changing to black, and deliquescing along with the pileus. Stipes smooth, long, erect, cylindrical, white, with an annular movable veil; hollow, but with a cord of filaments in the cavity; somewhat bulbous at the base, and terminating below the bulb in a short attenuated radicular process. A very handsome agaric, and very satisfactorily characterised; indeed I do not know any with which it can be confounded. In decay, like all those of the division in which it is placed, it melts into an inky black fluid. (Grev.)

***Coprinus ovatus*. Schaeff.**

Pileus about 2 in. across when expanded, ovate, then expanded, at first covered with an even pale ochraceous cuticle, which by the expansion and growth of the pileus becomes broken up into large concentric scales, white between the scales, the apical portion remaining intact like a cap, margin striate, flesh thin; gills free, very distant from the stem, lanceolate, about 2 lines broad, whitish then blackish-umber; stem 3-5 in. long,  $\frac{1}{4}$  in. thick or more at the swollen base, slightly attenuated upwards, attenuated into a rooting base, flocculose or fibrillose, white, hollow, bulbous portion solid, ring deciduous; spores 11-12  $\times$  7-8  $\mu$ .

*Coprinus ovatus*, Fries, *Epier.*, p. 242; Cke., *Hdbk.*, p. 224; Cke., *Illustr.*, pl. 659.

*Agaricus ovatus*, Schaeffer, *Icon.*, t. 7.

In pastures. Probably often passed over as *Coprinus*

*comatus*, from which, however, it is distinguished by the following characters; smaller size, margin of pileus striate, surface densely covered with concentric scales, apex smooth, cup-like, very distant gills with no tinge of purple, and fugacious ring.

***Coprinus sterquilinus*. Fr.**

Pileus about 2 in. across when expanded, conical, then expanded, sulcate more than half way from margin to disc, at first villous or silky, disc rather fleshy with squarrose squamules, silvery-grey, tinged with fuscous at the apex, flesh thin; gills free, ventricose, about 2 lines broad, pale then purple-umber; stem 4-6 in. high, slightly attenuated upwards, white, fibrillose, hollow, thickened base solid, and peronate for about an inch from the base, margin of sheath ending in a free border or ring.

*Coprinus sterquilinus*, Fries, *Epicr.*, p. 242; Cke., *Hdbk.*, p. 225; Cke., *Illustr.*, pl. 660.

On dung. A fine large species known by the squamulose apex of the pileus, the basal portion of the stem surrounded by a volva-like, adnate structure with a free upper margin. The stem soon becomes black when bruised. Base of stem not rooting but abrupt, and furnished with a few white fibres.

***Coprinus oblectus*. Fr.**

Pileus 1 in. or more across, cylindrical, then conico-campulate, at first whitish and everywhere silky, then glabrous and pallid-tan, sulcate nearly up to the disc, flesh membranaceous; gills free, linear, becoming blackish with a tinge of flesh-colour; stem 3-4 in. long,  $\frac{1}{4}$  in. thick, slightly attenuated upwards, soft, even, silky, white, hollow, base with a short adnate sheath, the upper margin of which is free and reflexed.

*Coprinus oblectus*, Fries, *Epicr.*, p. 243; Cke., *Hdbk.*, p. 225; Cke., *Illustr.*, pl. 661 (after Bolton).

*Agaricus oblectus*, Bolton, *Fung.*, t. 142.

On dung. Has not been recorded since Bolton's time. Pileus white and silky at first, then becoming glabrous and powdered with red; finally revolute. Spores—from an uncertain specimen in the Kew Herbarium— $23-26 \times 14 \mu$ .

The root is swelled, and emits white downy fibres.



The stem is white, of a soft silky surface, and easily splits in shining white filaments; it is hollow, but with a soft silky down in the perforation.

The curtain is white, soft, downy, and separates from the rim of the pileus; when the stem has attained but a small part of its height, it is permanent, abiding near the bottom of the stem, till the decay of the plant.

The gills are, while the plant is young, covered with a carnation-coloured powder, changing black in decay, rolling upwards, and dissolving in a black turbid gelly.

The pileus at first covered with a white downy epidermis which soon disappears, and the surface becomes striated, and of a soft, downy, livid, carnation colour; which colour, both in the young and old plants, consists of a soft powder, which at last changes black and dissolves.

Grows on new dung-hills. (Bolton.)

#### \*\* *Atramentarii*.

##### *Coprinus atramentarius*. Fr. (fig. 10, p. 303.)

Pileus 2-3 in. high, same across when expanded, at first ovate then expanded, often plicate and lobed, greyish, silky-fibrous, minutely mealy, apex brownish and minutely verruculose or squamulose, flesh thin; gills crowded, free, white then black with purple tinge; stem 4-6 in. high,  $\frac{1}{2}$ - $\frac{3}{4}$  in. thick, white, silky-shining, hollow, ring basal, very evanescent; spores  $12 \times 6 \mu$ ; cystidia numerous, sub-cylindrical, large.

*Coprinus atramentarius*, Fries, *Epier.*, p. 243; Cke., *Illust.*, t. 622; Cooke, *Hdbk.*, p. 225.

About old stumps, and on rich naked soil, but not on dung. Usually clustered and often irregular from mutual pressure. Gregarious, caespitose. Pileus  $3\frac{1}{2}$  in. or more high, sub-carnose, campanulate, obtuse, the edge uneven, dirty grey, at length brownish, innato-fibrillose, more or less furfureous and corrugated, the apex often scaly. Gills very broad and close, with numerous pellucid processes, ventricose, umber, the margin white, rounded behind, quite free. Stem  $3\frac{1}{2}$  in. high,  $\frac{1}{2}$  in. thick, fistulose, juicy, fibrillose, attenuated upwards, brittle, the substance banded concentrically. There is generally a prominent mark at the base,

caused by the pressure of the edge of the pileus, in an early stage of growth, which has somewhat the appearance of a volva. (Berk.)

Tufted. Pileus brownish-white or silvery grey, darker at the summit, remaining campanulate for a long time, above 2 in. from the base to the apex, obtusely and irregularly plicate, unequal, at length becoming plane and revolute. Lamellae free, silvery grey, changing to black, contiguous to each other, ventricose, dissolving in age. Stipes hollow, white, 3-8 in. long, cylindrical, about  $\frac{1}{3}$  in. thick. This species is well marked by the large folds or plaits which often extend from the base to the very apex of the pileus. (Grev.)

**Coprinus soboliferus. Fr.**

Pileus  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. across, subcylindrical, then ovato-campanulate, lower half of pileus usually undulate but not sulcate or striate, disc truncate, usually depressed, distinctly squamulose, dingy white, towards the apex tinged with pale brown, squamules darker, flesh very thin; gills free, lanceolate,  $\frac{1}{4}$  in. or more broad, crowded, pale then blackish; stem 5-8 in. long,  $\frac{3}{4}$  in. thick at the base, slightly attenuated upwards, silky, white, stuffed; towards the base there is a depressed zone caused by the edge of the pileus when young, ring fugacious; spores elliptical,  $15 \times 7 \mu$ .

*Coprinus soboliferus*, Fries, *Epicr.*, p. 243; Cooke, *Hdbk.*, p. 225; Cooke, *Illustr.*, pl. 848.

Amongst grass near to trunks, buried wood, &c. A very large and beautiful species, distinguished from *Coprinus atramentarius*, its nearest ally, by the larger size of every part, the costate or waved lower portion of the pileus, the truncate, depressed disc, with distinct squamules, the whitish colour of the pileus, and the imperfectly hollow or stuffed stem.

**Coprinus fuscescens. Fr.**

Pileus  $1-1\frac{1}{4}$  in. across, submembranaceous, ovato-expanded, dull, disc rather fleshy, even or cracked into squamules, greyish-brown, disc rufous; gills adfixed, blackish-umber; stem 4-5 in. long, about  $\frac{1}{4}$  in. thick, equal, fragile, hollow, subfibrillose, ring indistinct or absent, whitish; spores elliptical, apiculate,  $10 \times 6 \mu$ .

*Coprinus fuscescens*, Fries, Epicr., p. 244; Cooke, Hdbk., p. 226; Cooke, Illustr., pl. 663?

On trunks, dead stumps, &c.

Smaller and more slender than *Coprinus atramentarius*, pileus brownish-grey, disc becoming rufous, not sprinkled with micaceous particles, but at first covered with a mealy bloom; gills adnexed, attenuated from the stem to the margin, deliquescent. (Fries.)

In Cooke's figure of this species, drawn from specimens determined by the Rev. M. J. Berkeley, the pileus is bright chestnut in every part, and striate from the margin half-way up, and when old much split and more or less revolute, whereas Schaeffer's figure shows the species densely tufted, with the habit of *C. micaceus* and the pileus pale grey with tinge of brown, apex darker.

*Var. rimoso-squamosus*, Cooke, Illustr., pl. 664; Cke., Hdbk., p. 226.

Pileus  $1\frac{1}{2}$ -2 in. high and broad, ovate, then more or less expanded, greyish-brown, becoming brown towards the apex, where the cuticle is torn into large angular patches, pale between the patches; gills broad near the stem, becoming narrower towards the margin; stem whitish, rather flexuous, equal, hollow; spores as in the type.

On the ground, about stumps.

\*\*\* *Picacei*.

*Coprinus picaceus*. Fr.

Pileus 2-2 $\frac{1}{2}$  in. across, membranaceous, ovato-campanulate, striate up to the disc, smoky-black, variegated with large, irregular, superficial white patches; gills free,  $\frac{1}{2}$  in. or more broad, ventricose, greyish-black; stem 5-6 in. long, base bulbous, abrupt, otherwise equal  $\frac{1}{4}$ - $\frac{3}{8}$  in. thick, white, hollow, fragile, smooth; spores elliptical, apiculate,  $14 \times 8 \mu$ ; cystidia large, numerous.

*Coprinus picaceus*, Fries, Hym. Eur., p. 323; Cooke, Hdbk., p. 226; Cooke, Illustr., pl. 665.

On the ground. A very distinct and beautiful species. When young the pileus is cylindrical, and completely covered by a thick, whitish layer, which during the growth and expansion of the pileus becomes broken up into large,

irregular pieces that persist on the fully expanded pileus. Soon deliquescing after attaining full development. Distinguished from allied species by the large, irregular, superficial patches on the pileus. In *C. aratus* the pileus is dark and striate, but the evanescent covering consists of small, crowded scales, and the gills are at first adnexed, then breaking away. In *C. flocculosus* the pileus is whitish and the gills violaceous.

Pileus 2 in. broad and high, campanulate, glutinous, closely grooved, brown with a tinge of red above; margin cinereous, dimpled at the apex, epidermis cracking into large pale fawn-coloured subconic scales; flesh very thin; gills broad, ventricose, narrow in front, black, the extreme margin, except when deliquescent, white, not so close as in *C. atramentarius*, clothed with prominent spiculae (cystidia) exactly as long as the interstices are broad, quite free. Spores elliptic, black. Stem 6 in. high,  $\frac{1}{2}$  in. thick at the base, beautifully satiny with adpressed fibrillae, attenuated above, where it is subtomentose, and stained with the spores, subbulbous below, hollow, with a few stringy fibres attached to the walls. (Berk.)

**Coprinus aphthosus. Fr.**

Pileus about 1 in. high and broad, membranaceous, ovate-campanulate, not striate, at first covered with superficial scales, then naked, pallid; gills adnate, linear, white, then black; stem about 2 in. high, 2 lines thick, soft, white, equal, fibrillose, twisted, hollow; spores blackish,  $15-16 \times 10 \mu$ .

*Coprinus aphthosus*, Fries, *Epicr.*, p. 245; Cooke, *Hdbk.*, p. 226.

In hollow trunks, &c.

I have followed Fries in considering the above described form as the typical species, nevertheless it is rather unusual that he should accept the species he found as typical and run a previously described species, as that of Bolton, as a variety.

**Var. Boltoni. Mass.**

The following description by Bolton indicates a distinct variety of the present species, distinguished more especially by the repand, olivaceous pileus.

*Agaricus domesticus*, Bolton, p. 26, pl. 26; Cooke, Illustr., pl. 666 (partly after Bolton).

The root consists of a great number of downy grey fibres, some of which insinuate themselves into the substance of the putrid wood, whereon it grows; the rest crop like mouldiness upon its surface. The plants most commonly grow in bundles from the same root.

The stem is white and shines with a silky gloss; it is fistular, of a thin, light substance, the thickness of a goose-quill, and three or four inches high; it easily divides in white glittering filaments, and often abides after the pileus is fallen.

The curtain is extremely delicate, and vanishes as soon as the rim of the pileus separates from the stem.

The gills are in one series, numerous, broad, and deep; at first of a pale grey colour, but in decay dissolve in a black inky liquor.

The pileus is at first of an oval figure, and wrapped up in a volva, which is peculiar to itself, and does not in-wrap at the root. The volva is of a cottony substance, and a very pale grey-brown colour; as the pileus increases in bigness it bursts in fragments, and remains like warts on the surface. From an oval, the pileus changes to a conical figure; the margin undulated, next becomes bell-shaped, and at last lacerates and dissolves.

Grows on decaying pieces of moist wood, in cellars, cold kitchens, &c., in plenty. (Bolton.)

#### ***Coprinus flocculosus*. Fr.**

Pileus 2-3 in. across, membranaceous, ovate then expanded, dirty white, striate, covered with innate scales, splitting; gills free, narrow, subviolaceous, then brownish black; stem 3 in. high, hollow, attenuated upwards, white, slightly swollen at the base, smooth, silky, shining; spores  $10 \times 7-8 \mu$ .

*Coprinus flocculosus*, Fries, Epicr., p. 245; B. & Br., Ann. Nat. Hist., n. 926; Cke., Illustr., t. 667.

In fields and gardens. Solitary or tufted; stem often with loose silky fibrils that soon disappear. Allied to *C. aratus* and *C. lagopus*, but in the first the spores are elliptic-fusiform,  $15 \times 10-11 \mu$ , in the last named the disc of the pileus is bright brown.

**Coprinus similis.** B. & Br.

Pileus campanulate-ovate, pallid, lineato-striate, disc darker, hygrophanous, studded with brown-tipped acute warts, which eventually disappear; stem white, hollow, attenuated upwards; gills adnate, narrower behind, sub-linear, blackish, margin brown.

*Coprinus similis*, B. & Br., Ann. Nat. Hist., n. 1011; Cke., Hdbk., p. 227.

On trunks of dead trees. Resembling *Coprinus apthosus*, but differing in the striate pileus. Pileus 1 in. across.

\*\*\*\* *Tomentosi.***Coprinus extincorius.** Fr.

Pileus  $1\frac{1}{2}$ –2 in. across when expanded, submembranaceous, cylindric-clavate, then expanded and campanulate, straight, margin striate, at first clothed with floccose evanescent scales, whitish, apex tinged with brown; gills reaching the stem, lanceolate, whitish, becoming brownish-black; stem 4–5 in. long, 2–3 lines thick, slightly swollen at the base, below which it is continued as a rooting-stem, smooth, white, hollow; spores  $10\text{--}11 \times 6 \mu$ .

*Coprinus extincorius*, Fries, Epicr., p. 245; Cke., Hdbk., p. 227; Cke., Illustr., pl. 668; Bolt., t. 24.

On the ground about the roots of trees. Firmer than neighbouring species, pileus splitting when expanded, but not revolute, pallid, disc darker; becoming glabrous from the apex towards the margin, whereas in *C. fimetarius* the disappearance of the floccose substance is from the margin to the apex. (Fries.)

Fries considers that Bolton's figure, pl. 24, is a poor figure of the present species. The following is Bolton's account of his species.

The root is a little swelled, hard, white, and emits brown fibres from the sides; sometimes it sustains several plants, sometimes only one; it is not surrounded by a volva.

The stem is cylindrical, smooth, white, fistular, with a small perforation, wherein is a soft downy matter like cotton; it is an inch in circumference, and five inches high; there is no curtain.

The gills are all in one series, extremely numerous, thin,

deep, and delicate; of a pure white colour at first, afterwards turn to a pale brown, and in decay dissolve in a dark-brown liquor.

The pileus is shaped like an extinguisher, terminating bluntly above, and spreading out at the rim, where it is a little waved and undulated; the surface is smooth while the plant is young, afterwards becomes striated, and at last lacerates and dissolves. The colour is white at first, except a gentle tinge of brown near the top; as it advances in age, the white changes to a very pale brown: and in some specimens there are a few downy scales or tufts of a pale brown, as in the *Agaricus fimetarius*.

Grows amongst sand, in moist and shady situations about Halifax, but is rare there. (Bolton.)

***Coprinus fimetarius*. Fr. (fig. 11, p. 303.)**

Pileus 1-2 in. across, clavate then conico-expanded, soon split and revolute, greyish, apex tinged with brown; at first covered with white floccose scales, then naked, rimoso-sulcate; disc even, flesh thin; gills free, lanceolate, about 2 lines broad, then linear and wavy, black; stem 5-6 in. high, 2-3 lines thick, hollow, thickened at the base and there solid, squamulose; spores  $12-14 \times 7-8 \mu$ ; cystidia large, numerous.

*Coprinus fimetarius*, Fries, *Epicr.*, p. 245; Cke., *Hdbk.*, p. 227; Fries, *Hym. Eur.*, p. 324.

On manure-heaps, &c. Solitary or usually clustered, soon becoming revolute and deliquescing.

**Var. *pullatus*.** Fries, *Hym. Eur.*, p. 324; Cke., *Hdbk.*, p. 228; Cke., *Illustr.*, pl. 669.

Pileus with adpressed squamules and tomentose, soon naked, fuscous, then blackish; stem equal, becoming smooth.

On dung. Clustered. Stature of the type.

**Var. *cinereus*.** Schaeff., t. 100; Fries, *Hym. Eur.*, p. 324; Cke., *Hdbk.*, p. 228; Cke., *Illustr.* pl. 671.

Pileus membranaceous, floccosely mealy, then naked, ashy-grey; stem subequal, rootless, hollow to the base, often twisted; spores  $12-8 \mu$ .

On dung and rich soil.

Pileus 2 in. high before expansion, then 3 in., but very

variable in size, sulcate, at first cylindrical, rather flat at the apex, clothed with fugacious adpressed or slightly recurved feathery scales; then conico-campanulate; at length inverted with the margin split and rolled back. Gills black, dotted with pellucid conic processes and elliptic black spores. Stem sometimes 5 in. high,  $\frac{1}{4}$ – $\frac{1}{3}$  in. thick, clothed near the apex with thick patent down, near the base with adpressed scales, very fragile, hollow, without any cottony fibres. (Berk.)

*Var. macrorrhiza.* Fr., Hym. Eur., p. 324; Cke., Hdbk., p. 228; Cke., Illustr. pl. 670.

*Agaricus macrorrhizus*, Pers., Syn., p. 398.

Pileus at first with feathery squamules; stem short, villose, rooting, sometimes more or less marginately sub-bulbous; spores 13–14  $\times$  8–9.

On dung. Pileus pale and smaller than in the typical form, stem shorter, with a more or less elongated rooting base.

On a hot-bed, penetrating through the superincumbent mould and attached to the dung beneath by the long attenuated root. Pileus  $\frac{3}{4}$  in. broad, nearly 1 in. high, scaly, the scales sometimes forming a beautiful radiated crown at the apex, pale brown above, the margin greyish, striate. Gills brown, with a slight white border, close, free, very slightly ventricose,  $\frac{1}{8}$  in. broad. Stem 3 in. high, 3 lines thick at the base,  $\frac{1}{4}$  in. at the apex, straight, very downy towards the base, less so upwards, fistulose; root  $2\frac{1}{2}$  in. long. (Berk.)

#### **Coprinus tomentosus. Fr.**

Pileus 1–1 $\frac{1}{2}$  in. high, submembranaceous, cylindrical, then conical, afterwards splitting and expanded, striate, floccoso-tomentose, pale-grey, the velvety floccose layer becoming torn into persistent patches on the expansion of the pileus; gills free, narrow, brownish, then blackish brown; stem about 2 in. long, 2 lines thick, equal, velvety, greyish, hollow.

*Coprinus tomentosus*, Fr., Epicr., p. 246; Cke., Hdbk., p. 228; Cke., Illustr., pl. 672 A (after Bolton).

*Agaricus tomentosus*, Bulliard, t. 138.

On dung and in rich pastures. Pileus cylindrical, then narrowly pyramidal, at length expanded and more or less



split. Covered continuously at first with a velvety greyish felt that is persistent, and becomes torn into patches when the pileus expands. Pileus pallid or yellowish below the grey nap.

This agaric is found in woods and gardens in autumn; on the ground, also sometimes on dunghills; it is generally solitary, sometimes more or less gregarious, but not forming clusters. Stem hollow, naked, pubescent, terminating in a point at the base and the summit, 1-2 lines thick, and about 2 in. high. The pileus is ashy-grey or mouse-grey, becoming blackish with age, surface tomentose; the tomentum is easily removed when the pileus is smooth and striate. It is at first cylindrical, then conical, and long enough to cover more than half the length of the stem; as maturity approaches the pileus becomes more expanded, and the split margin turns up a little; during middle age it is 8-10 lines across, and 13-18 lines high. It is very fugacious and deliquescent. Gills free, narrow, more especially near to the stem, at first white, at length black. (Bulliard.)

The root is small, black, and emits a few short brown fibres.

The stem is upright, cylindrical, hollow; the substance white, and easily torn into filaments; it is covered, on the outside, with a lead-coloured down.

The gills are arranged in three series, those of the first series long and narrow; they are white on the sides, but furnished with a black down or powder on the edges, which, before the plant is torn, makes them appear wholly black.

The pileus is at first oval or oblong; when the rim begins to enlarge, it becomes of a pyramidal figure; at last bell-shaped, lacerates, and soon dissolves. In its first stages it is thickly covered with a grey or lead-coloured down, which covering tears in fragments as the pileus extends in breadth, and remains on its white striated surface in broken, deformed, grey patches.

I gathered this species near Ogden-Kirk, amongst wet moss, in the ground where peat is dug for fuel. (Bolton.)

#### **Coprinus niveus. Fr.**

Pileus  $\frac{1}{4}$ -1 in. across, submembranaceous, elliptical, then campanulate and expanded, almost persistently covered with

snow-white floccose-down; gills slightly attached, narrow, becoming blackish; stem  $1\frac{1}{2}$ –3 in. high, subequal, or slightly attenuated upwards, villose, white, hollow; spores  $16 \times 11$ – $13 \mu$ .

*Coprinus niveus*, Fries, Epicr., p. 246; Cke., Hdbk., p. 228; Cke., Illustr., pl. 672 B.

On dung, especially of horses. Distinguished by snow-white colour, persistently tomentose pileus, and small size. *Coprinus narcoticus* is distinguished by its strong smell of opium, and *C. stercorarius* by the dense micaceous mealy coat covering the pileus at first; it is also larger in every part.

Pileus  $\frac{1}{2}$ –1 in. across, campanulate, at length expanded and depressed with the margin rolled back, clothed with dense scaly meal; the margin striate, very thin and delicate. Gills narrow, free, black, subventricose. Stem 2 in. or more high, 1 line thick, thickest at the base, sericeo-squamulose, hollow, fragile, splitting longitudinally. (Berk.)

#### ***Coprinus cothurnatus*. Godey.**

Pileus exceedingly thin, conico-campanulate, then expanded, densely furfuraceous, becoming umbonate and unequally split, reddish-white; stem hollow, attenuated upwards, white, squamulose, base squamuloso-vaginate, about  $1\frac{1}{2}$  in. long, 1–2 lines thick; gills free, subanceolate, crowded, white, then flesh-coloured, at length blackish.

*Coprinus cothurnatus*, Godey, in Gillet's Champ. de France, p. 605, with a fig.; Sacc., Syll., vol. v., n. 4410; Cke., Hdbk., p. 228.

On cow-dung in pastures.

The English specimens referred to this species are yellowish, the pileus about 1 in. across, stem 2 in. long.

#### \*\*\*\*\* *Micacei*.

#### ***Coprinus micaceus*. Fr.**

Pileus  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. across, submembranaceous, elliptical, then campanulate, coarsely striate, disc even, ochraceous-tan, disc darker, margin usually more or less repand; when young densely covered with glistening minute crystals of oxalate of lime, at length naked, when fully developed rimoso-

sulcate; gills 2-4 lines broad, adnexed, lanceolate, rather crowded, whitish, then brown, finally black; stem 2-3 in. long, about  $\frac{1}{4}$  in. thick, equal, even, silky, whitish, hollow; spores elliptical, blackish,  $7-8 \times 4-5 \mu$ .

*Coprinus micaceus*, Fries, *Epicr.*, p. 247; Cke., *Hdbk.*, p. 229; Cke., *Illustr.*, pl. 673.

About old stumps, posts, &c. Generally densely fasciculate. In rainy weather subdeliquescent, pileus soon naked, and becoming dark reddish-brown. In dry weather the pileus becomes pale in colour, and the glistening particles of lime, which resemble mica in their appearance, are permanent.

Caespitose; pileus  $\frac{3}{4}$ -1 in. or more broad, half-ovate, often more or less irregular from the dense mode of growth, sprinkled with glistening meal, strongly striate, almost plicate, rufous, the umbo darker; the margin cinereous, very thin; veil very fugacious. Gills attenuated in front, broad behind, ascending, attached above, umber mottled with the sporules, which appear black when viewed in the mass, but are really brown-purple; stem 2-3 in. high or more, 2 lines thick, hollow, brittle, squamuloso-pulverulent, the epidermis often cracked into little scales, very faintly tinged with red, attenuated upwards. (Berk.)

#### *Coprinus aratus*. B. & Br.

Pileus submembranaceous, 2-3 in. across, campanulate, then expanded, umber, deeply sulcate up to the darker usually wrinkled disc, sprinkled with large micaceous particles, revolute in decay; gills narrow, attenuated at either end, attached, then seceding and becoming free, deep rich brown, then black; stem 4-3 in. high, 2-3 lines thick, attenuated upwards, slightly bulbous at the base, snow-white, silky, hollow, umber within; spores  $15 \times 10-11 \mu$ .

*Coprinus aratus*, Berk. and Browne, *Ann. Nat. Hist.*, n. 927, and again after n. 1956; Cke., *Handbk.*, p. 229; Cke., *Illustr.*, tabs. 674 and 675.

In hollow trees, on the ground, &c., solitary or clustered; resembling *Coprinus micaceus* in habit, but larger and umber-colour.

A group occurred and showed some differences from the single specimen before seen; disc sometimes rugose, sometimes

even; gills at first attached, but soon separating from the stem so as to appear free, but still connected at the base as if by a slight collar, hence instead of "*lamellis liberis*," it should be "*secedentibus*." (Berk.)

**Coprinus radians. Fr.**

Pileus 1-2 in. across, membranaceous, ovato-campanulate, glistening with minute crystals of oxalate of lime, disc granuloso-squamulose; margin striate, yellowish-fulvous, becoming pale, sometimes becoming subdiscoïd; gills about  $1\frac{1}{2}$  lines broad, slightly attached to the stem, pale, then violet-black; stem  $1-1\frac{1}{2}$  in. long, equal, smooth, even, hollow, whitish, furnished at the base with radiating strands of mycelium; spores violet-black, elliptical,  $7 \times 4 \mu$ .

*Coprinus radians*, Fries, Epicr., p. 248; Cooke, Hdbk., p. 229; Cooke, Illustr., pl. 676 A.

*Agaricus radians*, Desmaz., Ann. Sci. Nat. 19, t. 10, f. 1.

On damp plastered walls, rather small, solitary or sub-caespitose, pileus yellow-fulvous, subdiscoïd, becoming pale; stem short, incurved from the position of growth.

Pileus 2 in. broad, gills free, numerous, at first white; stem  $1\frac{1}{2}$  in. high, 2 lines thick, cylindric, fistulose, almost equal; curved in consequence of its vertical place of growth, naked, smooth, furnished with a radiating base 2 in. broad. (Desmazières.)

The fungus called *Lycoperdon radiatum*, Sowerby, t. 145, is the very young stage of the present species.

**Coprinus papillatus. Fr.**

Pileus  $\frac{1}{2}-\frac{3}{4}$  in. across, elliptical, then campanulate, then often splitting and almost plane or even upturned, but the disc remaining prominent, striate, greyish-furfuraceous, centre livid smooth-colour, rough with minute papillæ; gills free but close to the stem, narrow, black; stem about 1 in. long, slender, equal, hollow, white, hyaline except at the base; spores  $15 \times 7 \mu$ .

*Coprinus papillatus*, Fries, Epicr., p. 248; Cooke, Hdbk., 229; Cooke, Illustr., pl. 676 B.

*Agaricus papillatus*, Batsch, fig. 78.

On the ground, also on dung. Minute, but rather persistent.

\*\*\*\*\* *Glabrati*.***Coprinus alternatus*. Fr.**

Pileus  $\frac{3}{4}$ –1 in. across, when expanded  $1\frac{1}{2}$ –2 in., flesh thin, hemispherical, then expanded and umbonate, striate, quite smooth, chalky-pallid or very pale buff, disc darker; gills adnate, narrow, grey, then black; stem 3–4 in. long, about 2 lines thick, and equal except the more or less thickened base, or sometimes attenuated upwards, hollow, whitish, smooth; spore black, broadly pip-shaped,  $10 \times 6$ –7  $\mu$ .

*Coprinus alternatus*, Fries, *Epicr.*, p. 248; Cooke, *Hdbk.*, p. 230; Cooke, *Illustr.*, pl. 677.

*Agaricus alternatus*, Schum., *Saell.*, n. 1874.

On the ground. In small clusters. In Cooke's figure, *Illustr.*, pl. 677, the gills are represented free from the stem. Stem equal slightly or not at all thickened at the base, subflexuous.

***Coprinus deliquescens*. Fr.**

Pileus  $1\frac{1}{2}$ –3 in. across, ovato-campanulate, then expanded, usually rather repand, flesh rather thick at the disc, thin towards the margin, distantly striate, glabrous except the disc, which is minutely papillose, livid grey, or smoky, disc often tinged rufescent; gills free, at length distant from the stem, narrow, grey, then blackish; stem 3–4 in. high, about  $\frac{1}{4}$  in. thick, corticated, whitish, glabrous, hollow, subequal or slightly attenuated upwards; spores elliptical, obliquely apiculate,  $8 \times 5 \mu$ .

*Coprinus deliquescens*, Fries, *Epicr.*, p. 249; Cooke, *Hdbk.*, p. 230; Cooke, *Illustr.*, pl. 678.

*Agaricus deliquescens*, Bulliard, t. 558, f. 1.

On trunks, stumps, and on heaps of dead leaves, &c. Slightly caespitose. Sometimes confounded with *Coprinus atramentarius*, from which it differs in every part being more slender, and in the free, distant gills.

Stem naked, corticated, firm, 4 in. long, 2–4 lines thick, equally attenuated upwards, glabrous, white. Pileus membranaceous, campanulate, then expanded, almost glabrous, disc minutely papillose, livid-fuliginous, 3–4 in. broad, not splitting, but revolute, striate, striae broad but not deep, gills free, distant from the stem, very much crowded, flexuous, very narrow, about  $\frac{1}{4}$  line broad. (Fries.)

**Coprinus tardus.** Karst.

Pileus 1-2 in. high and wide, rather fleshy, thin, fragile, ovate, then campanulate, sulcate, or deeply striate, quite glabrous, rather dry, bright brown becoming pale ochraceous-tan; gills adnate, crowded, very narrow, broadest behind, deliquescent, whitish, then tinged with brown, at length black; stem 4-6 in. high, about 2 lines thick, equal, hollow, subflexuous, minutely striated at the apex, slightly downy, whitish; spores elliptical or sometimes subangular, opaque, blackish brown, subinaequilateral,  $12-18 \times 7-9 \mu$ .

*Coprinus tardus*, Symb. ad Myc. Fenn., vi. p. 20; Icon. Sel. Hym. Fenn., fig. xix.; Cke., Hdbk., p. 230; Cke., Illustr., pl. 719.

On the ground.

Densely tufted. Smell none. Allied to *Coprinus deliquescens*, but distinct in the following points: pileus fleshy, hardly expanded, not punctate at the disc, never revolute, hardly splitting, dryish, stem equal, gills adnate, crowded, not flexuous, white, than brownish, at length black. (Karsten.)

**Coprinus digitalis.** Fr.

Caespitose. Pileus about 1 in. high and broad, submembranaceous, parabolic, altogether glabrous and naked, disc even, the remainder striated, whitish or straw-colour, centre often darker, splitting with age; gills slightly adnexed, ventricose, whitish-brown, then blackish, margin at first micaceous; stem 1-5 in. long, 1 line thick, equal, hollow, rather flexuous, glabrous, corticated, white.

*Coprinus digitalis*, Fries, Epicr., p. 249; Fries, Monogr. Suec., i. p. 462.

In damp places in woods, &c. Caespitose, fragile, terrestrial. In the mature fungus the pileus is livid olive or yellowish-grey, and the gills appear to be adnate.

**Coprinus congregatus.** Bull. (fig. 12, p. 303.)

Pileus  $\frac{1}{2}$ - $\frac{3}{4}$  in. high, cylindrical, then campanulate, finally expanded and split at the margin, smooth, viscid, margin slightly striate, ochraceous; gills about 1 line broad, slightly adnexed, white, finally becoming black; stem 1-1 $\frac{1}{2}$  in. high, equal, smooth, hollow, whitish.

*Coprinus congregatus*, Fries, *Epicr.*, p. 249; Fries, *Hym. Eur.*, p. 328; Cke., *Hdbk.*, p. 230; Cke., *Illustr.*, pl. 679.

*Agaricus congregatus*, Bull., t. 94.

On the ground, also in hothouses, &c.

Readily distinguished by the densely caespitose mode of growth, the small size, the viscid, ochraceous, glabrous pileus which remains elongato-cylindrical for some time, then becomes campanulate, and finally expands and splits at the margin.

Densely caespitose, fragile, readily distinguished from *Coprinus digitalis* by its much smaller size; stem short, thin; pileus from cylindrical to campanulate, glabrous, ochraceous, gills adfixed, linear, white, then black. (Fries.)

## TRIBE II.—VELIFORMES.

### \* *Cyclodei*.

#### *Coprinus Hendersoni*. Berk.

Pileus about 2 lines high, up to  $\frac{1}{2}$  in. across when expanded, membranaceous, at first subcylindrical, then becoming plano-convex, minutely pruinose, apex pale brown, greyish towards the margin; gills free, narrow, becoming black, margin white, rather distant; stem 1-1 $\frac{1}{2}$  in. long, slender, slightly attenuated upwards, almost or quite smooth, white, furnished with a distinct ring below the middle, hollow; spores 10  $\times$  5  $\mu$ .

*Coprinus Hendersoni*, Berk., *Outl.*, pl. 24, f. 8; Cke., *Hdbk.*, p. 231; Cke., *Illustr.*, pl. 680 A.

*Agaricus Hendersoni*, Berk., *Eng. Flora*, vol. v. p. 122.

On hotbeds and on dung in fields.

Extremely tender; pileus 4-6 lines broad, at first subcylindric, granulose under a lens, apex brownish, shaded into cinereous towards the margin, at length plano-convex; margin folded. Gills rather distant, free, powdered with the black sporules, the extreme margin white, narrow; at length appearing like mere wrinkles. Stem 1 $\frac{1}{2}$  in. high, not a line thick, white, nearly or quite smooth, hollow, attenuated upwards, furnished with a cup-shaped more or less distant, permanent ring. (Berk.)

**Coprinus lagopus.** Fr.

Pileus 1-2 in. across, very thin, cylindrical, then campanulate, covered with white flocculent down, becoming glabrous, striato-sulcate up to the umbo, at length splitting and more or less revolute, whitish or greyish, disc brownish; gills free, at length distant from the stem, narrow, becoming black; stem elongated, usually equally attenuated upwards, white, every part clothed with white floccose down, hollow, very fragile; spores  $14-16 \times 10-12 \mu$ .

*Coprinus lagopus*, Fries, *Epicr.*, p. 250; Saunders and Smith, t. 19; Cke., *Hdbk.*, pl. 231; Cke., *Illustr.*, pl. 681.

On rotten wood, dung, &c.

Fries distinguishes two forms. A, *nemorum*, stem slender, 4-6 in. long. B, *viarum*, stem 2-3 in. long, pileus broader, livid. Both forms are inodorous. The pileus of the long-stemmed form is sometimes entirely clear brown, at others greyish with a brownish disc. Stem very weak, 5 in. and more in length, 1 line thick, attenuated at both ends. Pileus thin, campanulato-expanded, about 1 in. across, when young elegantly flocculose, then furrowed, disc livid. Gills rather distant. (Fries.)

**Coprinus narcoticus.** Fr. (fig. 6, p. 303.)

Pileus  $\frac{1}{2}$ - $\frac{3}{4}$  in. across, foetid, very thin, cylindric-clavate, then expanded, at length revolute, covered at first with white, recurved, floccose scales, then naked, greyish-white, hyaline, striate; gills free but very close to the stem, white, then becoming blackish; stem  $1\frac{1}{2}$ -2 in. long, about 1 line thick, fragile, at first covered with white down, then almost glabrous, hollow; spores elliptical,  $11 \times 5-6 \mu$ .

*Coprinus narcoticus*, Fries, *Epicr.*, p. 250; Cke., *Hdbk.*, p. 231; Cke., *Illustr.* pl. 680 B.

*Agaricus narcoticus*, Batsch, f. 77.

On dung. Caespitose. Smell very strong and disagreeable, described by Fries as alkaline-narcotic, and in this peculiarity is distinct from all other species. The stem is sometimes straight, at others flexuous.

Smell very strong, otherwise difficult to distinguish from *Coprinus niveus*. Stem about 2 in. long, equal, 'subulate,' at length glabrous. Pileus when young conico-cylindrical, be-



coming naked when expanded, up to 1 in. across. Gills white then blackish. (Fries.)

***Coprinus macrocephalus*. Fr.**

Pileus up to  $\frac{3}{4}$  in. high and broad when expanded, cylindrical, then campanulate-expanded, ashy-grey, disc brownish, sprinkled with paler pointed scales, margin slightly striate, flesh rather thick for the size of the species; gills quite free, up to 1 line broad, at length black; stem  $1\frac{1}{2}$ –2 in. long, 1 line or more thick, subequal, dirty white, clothed with white down and long free fibres, base strigose, hollow; spores broadly elliptical or obliquely pip-shaped,  $11\text{--}13 \times 7\text{--}8 \mu$ ; cystidia elliptical, large, numerous.

*Coprinus macrocephalus*, Fries, Hym. Eur., p. 329; Cke., Hdbk., p. 231; Cke., Illustr. pl. 682A.

*Agaricus macrocephalus*, Berk., Eng. Flora, vol. v. p. 122.

On putrid dung. Subcaespitose. Distinguished amongst the small grey species of *Coprinus* by the pointed squamules adorning the pileus, and more especially by the long loose fibrils on the stem.

Pileus  $\frac{5}{8}$  in. broad,  $\frac{5}{8}$  in. high, linear when young, then cylindrico-campanulate, the margin slightly spread out, adorned with elegant adpressed or patent scales, the remains of the veil; apex brown, shaped off into slate colour on the margin, scarcely at all pubescent. Gills linear, perfectly free, at length black, clothed with pellucid spiculae. Stem 1–2 in. high, 2 lines thick, ascending, dirty white, fistulose, clothed with short cottony down, and with longer, sometimes deflexed, loose fibres, strigose at the base, somewhat attenuated upwards and stained with the black elliptic spores. A very distinct species, apparently near *A. lagopus* (= *Coprinus lagopus*). (Berk.)

***Coprinus nycthemerus*. Fr.**

Pileus  $\frac{1}{2}$ – $\frac{3}{4}$  in. when expanded, membranaceous, at first conico-cylindrical, then expanded and splitting at the margin, floccosely-mealy, radiately plicate, margin striate, striae furcate, then naked, grey, disc tawny; gills free, at length distant from the stem, narrow, blackish; stem 2–3 in. long, equal, hollow, flaccid, whitish, glabrous; spores  $9 \times 6 \mu$ .

*Coprinus nycthemerus*, Fries, *Epicr.*, p. 251; Cke., *Hdbk.*, p. 232; Cke., *Illustr.*, pl. 682 B?

On dung and manured ground. Subcaespitose. In Cooke's figures quoted above the pileus is in every specimen tawny at the disc and becoming very pale dull yellow towards the margin, whereas Fries distinctly states in italics "*griseo, disco fusco*," hence it is not certain that the species of Fries is depicted.

***Coprinus radiatus*. Fr.**

Pileus 2-3 lines across, exceedingly delicate and ephemeral, cylindrical, then campanulate, at length plane, at first covered with a greyish down, soon splitting, radially, plicate, yellowish, disc tawny; gills free, few and distant, narrow, blackish; stem  $\frac{1}{4}$ -1 in. high, filiform, hyaline, becoming glabrous, whitish; spores  $7-8 \times 5 \mu$ .

*Coprinus radiatus*, Fries, *Epicr.*, p. 251; Cke., *Hdbk.*, p. 232; Cke., *Illustr.*, pl. 682 A.

On dung. Distinguished by its very small size and the plane, fissured pileus. Very ephemeral.

On horse-dung, often on the under side, in grassy woods, &c. Very tender, so that a breath destroys it. Pileus 1-2 lines broad, at first digitaliform, yellowish, the apex obtuse, darker, striate and downy, when full grown pale-brown, or nearly colourless, the centre sometimes dimpled, strongly furrowed, edge notched and often split in a radiated manner, so as to appear like the spokes of a wheel; gills about 10, with minute smaller ones in the interstices. Stem 1-3 in. high, very slender, quite filiform, smooth, but sometimes fibrillose and tomentose, dusky or colourless, a little thickened at the base, where it is slightly downy. (Berk.)

***Coprinus Spraguei*. B. & C. (fig. 13, p. 303.)**

Pileus  $\frac{1}{2}$ - $\frac{3}{4}$  in. across, membranaceous, conical, then campanulate, finally expanded and revolute, tomentose, greyish, disc tawny, margin coarsely striate; stem  $1\frac{1}{2}$ -2 in. high, about 1 line thick, equal, smooth, pale cinnamon, hollow; gills free, few and distant, narrow, from white becoming blackish; spores elliptical, slightly curved,  $10 \times 5 \mu$ .

*Coprinus Spraguei*, Berk. & Curt., *Ann. Nat. Hist.*, Oct.

1859; Cke., Hdbk., p. 232; Cke., Illustr., pl. 683 B; Berk., Outlines, p. 182.

On the ground. Somewhat resembling *Coprinus plicatilis* in size and general appearance, but readily distinguished from this and all other species by the pale cinnamon-coloured stem, and the slightly curved spores. The disc is not depressed when the pileus is expanded as in *C. plicatilis*.

**\*\* Furfurelli.**

***Coprinus domesticus*. Fr.**

Pileus  $1\frac{1}{2}$ –2 in. across, thin, ovate, then campanulate, obtuse, furfuraceo-squamulose, smoke-coloured or pale greyish-white, disc brown, undulato-sulcate, splitting; gills adnexed, crowded, narrow, at first reddish-white, then blackish-brown; stem 2–3 in. long, 2–3 lines thick, slightly attenuated upwards, adpressedly silky, white, hollow, spores  $14\text{--}16 \times 7\text{--}8 \mu$ .

*Coprinus domesticus*, Fries, Epicr., p. 251; Cke., Hdbk., p. 232; Cke., Illustr., pl. 684.

On moist rotten wood, damp carpets, on damp walls, &c. Caespitose. The largest species included in the present section of the genus.

Very brittle, often caespitose; pileus 2 in. broad, membranaceous, campanulate, apex nearly smooth, reddish-brown. Gills white when young, then ruddy, at length brown-black. Stem 2–3 in. high, 3 lines thick, even, attenuated upwards. (Fries.)

***Coprinus stercorarius*. Fr.**

Pileus above 1 in. high, when fully expanded  $1\frac{1}{2}$  in. broad, very thin, ovate then campanulate, sometimes expanded, and a little upturned at the margin, densely covered with a white, glistening, micaceous powder, margin striate; gills adnexed about  $1\frac{1}{2}$  lines broad, ventricose, black; stem at first ovately bulbous, then elongated, 3–5 in. long, equally attenuated upwards from the base, at first minutely mealy, white, hollow; spores  $14\text{--}15 \times 8 \mu$ .

*Coprinus stercorarius*, Fries, Epicr., p. 251; Cke., Hdbk., p. 232; Cke., Illustr., pl. 685 A.

On dung, manured ground, &c. Differing from the other

species included in the present section in the pileus scarcely splitting. Resembles *Coprinus niveus* in the pure white colour of the pileus and stem, but is larger in every part, and the pileus is covered with a micaceous meal and not with white floccose down as in *C. niveus*.

***Coprinus ephemerus*. Fr.**

Pileus  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, very thin, ovate, then campanulate, finally expanded and splitting, radiato-sulcate, at first slightly furfuraceous, disc elevated, even, rufescent; gills slightly attached, linear, white, then brownish, at length blackish; stem  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. high, 1 line or more thick, equal, glabrous, pellucid, hollow, whitish; spores  $16$ – $17 \times 9$ – $10 \mu$ .

*Coprinus ephemerus*, Fries, Epicr., p. 252; Cke., Hdbk., p. 233; Cke., Illustr., pl. 685 B.

On dung-hills, manured ground, &c. To the naked eye appearing almost glabrous, but under a lens seen to be distinctly furfuraceous. Known from *Coprinus plicatilis* by the disc of the pileus being prominent and not depressed.

Extremely fugacious. Pileus  $\frac{1}{4}$ – $\frac{3}{4}$  in. broad, ovate or campanulate, at length deflexed, the margin finally splitting and curling back; apex umber, shaded gradually into a delicate bluish-grey; striate, scaly when young. Gills at length black, linear, edge downy, white. Stem 1–2 in. high, 1 line thick, dirty white, with a few fibrillae, at length naked. (Berk.)

***Coprinus sociatus*. Fr.**

Pileus very thin, ovate, then campanulate, soon splitting, radially plicate, mealy, fuscous, becoming pale, disc umber, at length umbilicate; gills adnexed to a collar, greyish-black; stem 2 in. long, attenuated, glabrous, white.

*Coprinus sociatus*, Fries, Epicr., p. 252; Fries, Hym. Eur., p. 331; Cke., Hdbk., p. 233.

On walls, moist ground in gardens, &c.

Stem hollow, 2 in. long or a little more, slightly and gradually attenuated from the base, glabrous, white, not pellucid, oval-cylindrical, then expanded,  $1\frac{1}{2}$  in. broad, densely grooved, the elevated ribs scurfy, brown becoming pale, disc even, reddish-brown, centre depressed; gills blackish-brown, edge similarly coloured, tardily deliquescent. (Fries.)

**Coprinus plicatilis.** Fr.

Pileus  $\frac{3}{4}$ –1 in. across, membranaceous, ovate-cylindrical, then campanulate, eventually becoming plane, the margin splitting and revolute, sulcate up to the disc, almost glabrous, brown, then greyish, the disc remaining darker, broad, even, at length depressed; gills attached to a collar distant from the stem, narrow, distant, greyish-black; stem 2–3 in. long, about 1 line thick, equal, white, smooth, hollow; spores  $12\text{--}14 \times 8\text{--}10 \mu$ .

*Coprinus plicatilis*, Fries, *Epicr.*, p. 252; Cke., *Hdbk.*, p. 233; Cke., *Illustr.*, pl. 686 A.

*Agaricus plicatilis*, Curtis, *Flor. Lond.*, t. 200.

In rich pastures, &c. Distinguished by the almost glabrous membranaceous pileus being sulcate up to the broad, even disc which becomes depressed at maturity, very ephemeral.

Extremely fugacious. Pileus  $\frac{1}{4}$ –1 in. broad, cylindrical, furfuraceous, at length plane, nearly naked, umbilicated, grey, yellowish-brown in the centre, beautifully plicate, membranaceous, pellucid. Gills free, dark-grey, subdistant; very narrow, tender. Stem 1–3 in. high, very slender, fragile, smooth, grey tinged with brown, sometimes white, hollow. (Grev.)

**Coprinus filiformis.** B. & Br.

Pileus 1–2 lines high, grey, cylindrical, striate, atomate; stem  $\frac{1}{4}$ – $\frac{3}{4}$  in. high, very thin, white, sparingly fibrillose; gills linear, spores globose,  $5 \mu$  diameter.

*Coprinus filiformis*, Berk. & Broome, *Ann. Nat. Hist.*, n. 928; pl. xv. f. 8; Cke., *Hdbk.*, p. 233; *Illustr.*, pl. 686 B.

On the ground in a wood. This minute species is not larger than *Mucor caninus*, and is certainly distinct from any which has been described. (B. & Br.)

Specimens have since been met with rather larger than those described by Berkeley, but agreeing with the type in every other respect.

\*\*\*\* *Hemerobii.***Coprinus hemerobius.** Fr.

Pileus  $\frac{3}{4}$ –1 in. across, ovate-campanulate, then expanded, coarsely sulcate up to the obtuse disc, smooth from the first,

bay-brown, flesh very thin, splitting; gills narrow, attached to an obscure collar, pale, then black; stem  $2\frac{1}{2}$ –5 in. long, 2–3 lines thick at the base, becoming thinner upwards, smooth, even, whitish, hollow; spores elliptical,  $7-8 \times 6 \mu$ .

*Coprinus hemerobius*, Fries, Hym. Eur., p. 332; Cke., Hdbk., p. 234; Cke., Illustr. pl. 687A; Bolton, t. 31.

On roadsides. Distinguished amongst the very thin-fleshed sulcate species by the bay-brown pileus being perfectly free from meal at all ages. *Coprinus plicatilis*, a nearly allied species, common in pastures, has the gills distant from the stem and attached to a distinct collar, disc of pileus becoming depressed, and very large spores. The figures of the present species given by Bolton have a longer stem than those figured by Cooke, the base of the stem is also more distinctly bulbous.

The root is a little brown bulb, emitting brown fibres from its bottom and sides.

The stem is cylindrical, fistular, transparent, of a whitish-grey colour, the thickness of a swallow's quill, and 4 or 6 in. high.

The curtain is very delicate, vanishes when the plant is about an inch high, but leaves a black vestige on the stem, which abides for a little time, and then disappears.

The gills are in two series, narrow, thin, transparent, and of a grey colour, changing black in decay.

The pileus is at first conical, smooth, and brown, afterwards the rim begins to diverge, and to appear dimly striated, with fine tender lines; the next stage a black ciliation begins to appear round the rim, and as it advances in growth the pileus expands, and what before appeared to be striae, are now found to be actual plaits, the angles whereof are alternately brown and lead-coloured; the black ciliation is divided into little tufts, which adhere to the extremities of the brown angles, and give a pretty appearance to the rim of the pileus. It is about  $1\frac{1}{2}$  in. in diameter, of a tender watery substance, and semitransparent; in decay it dissolves into a brown liquor. It grows up in one night, and perishes next day.

Grows in meadows where the soil is rich, in September and October, about Halifax plentifully. (Bolton.)

Pileus very thin, ovate, then campanulate, not gaping and

expanded but deeply sulcate, glabrous from the first, apex even, not depressed, bay-brown; gills linear, 1-1½ lines broad, adnate to an almost obsolete collar, pale, then black; stem very fragile, 3 in. and more long, attenuated upwards, glabrous, pallid. With the habit of *Coprinus plicatilis*, but taller. (Fries.)

*An exotic species imported with living plants.*

***Coprinus platypus*.** Berk. (fig. 15. p. 303.)

Pileus 2-3 lines across, campanulate, convex, then expanded, white, then ochraceous-flocculose; gills free, narrow, distant, becoming black; stem about 1½ in. long, very slender, even, whitish, discoid at the base; spores blackish,  $8 \times 6 \mu$ .

*Coprinus platypus*, Berk., in Cooke's Illustr., pl. 687 v; Cke., Hdbk., p. 234.

On palm stem in a conservatory. In all probability an introduced species; readily distinguished by its small size and especially by the flattened, discoid base of the stem, in which respect it resembles some of the minute species of *Mycena*, as *M. stylobates*, &c.

**ANELLARIA.** Karst. (figs. 2, 5, p. 303.)

Pileus slightly fleshy, smooth and even; gills adnexed, dark slate-colour, variegated with the black spores; stem central, smooth, shining, rather firm, ring present at first, either persistent, or forming a zone round the stem.

*Anellaria*, Karsten, Hattsv. i. p. xxv.; Sacc., Syll., vol. v. p. 1125.

*Panaeolus*, Fries (in part).

Allied to *Panaeolus*, but distinguished by the presence of a more or less perfect ring round the stem, bearing in fact the same relation to *Panaeolus* that *Amanita* does to *Amanitopsis* amongst the Leucosporae.

***Anellaria separata*.** Karst. (fig. 2, 5, p. 303.)

Pileus 1-1½ in. across, height about the same, ovate, then campanulate, not expanding, viscid, even, ochraceous, then whitish, shining, flesh rather thick; gills adfixed, ascending,

thin, crowded, broad, greyish-black, margin paler; stem 3-5 in. long, straight, base subclavate, attenuated upwards, whitish, shining, apex striatulate, ring persistent, distant; spores broadly elliptic-fusiform, black, opaque,  $10 \times 7 \mu$ .

*Anellaria separata*, Karsten, Hattsv. i. p. 517; Sacc., Syll. 6, n. 4560.

*Agaricus* (*Panaeolus*) *separatus*, Cke., Hdbk., p. 218; Cke., Illustr. t., 623.

On dung. Rather variable in size. Whole plant whitish when old, distinguished by the campanulate pileus that is often wrinkled when old, and the long stem with a persistent ring.

Pileus campanulate, but very obtuse at the summit,  $\frac{1}{2}$ -1 $\frac{1}{4}$  in. from the base to the apex, not expanding at the base without cracking, yellowish-white, glutinous, smooth, polished, "wrinkled when old like wash-leather," (With.) Lamellae 2-3 lines broad, vanishing towards the margin of the pileus, very dark grey, numerous. Stipes 3-6 in. high, white, hollow, rather firm, 2-3 lines thick, shining, somewhat bulbous, sprinkled with the dark sporules, veil rather fugacious. (Grev.)

#### *Anellaria scitula*. Massee.

Pileus about  $\frac{1}{2}$  in. across, obtuse, campanulate, smooth, even, viscid, margin exceeding the gills, dirty pale ochre, flesh thin; white; gills almost free, crowded, becoming ashy grey, speckled with the black spores, margin entire, paler; stem 1-1 $\frac{1}{2}$  in. long, not a line in thickness, fistulose, white, shining, base peronate, the sheath ending in a persistent ring below the middle of the stem; spores black, opaque, with a colourless hilum,  $12-13 \times 4 \mu$ .

*Anellaria scitula*, Massee, Sacc., Syll., vol. vi. n. 4562.

*Agaricus* (*Panaeolus*) *scitulus*, Massee, Grev. xv. p. 65; Cke., Illustr., 625b; Cke., Hdbk., p. 219.

On soil in a flower pot. Resembling *A. separata* in miniature, but differing in the sheathed stem and basal ring.

#### *Anellaria fimiputris*. Karsten.

Pileus 1-2 in. across, submembranaceous, conico-expanded, subgibbous, even, viscid, smoky-grey, pale dingy ochraceous when dry; gills adnate, 2-3 lines broad, greyish-black, margin the same colour; stem 3-5 in. long, about 2 lines



thick, often rather flexuous, equal, smooth, pallid, ring imperfect, but its position always evident, hollow; spores elliptical, apiculate,  $9-10 \times 6 \mu$ .

*Anellaria fimiputris*, Karsten, Hattsv. i. p. 518; Sacc., Syll. 6, n. 4561.

*Agaricus* (*Panaeolus*) *fimiputris*, Cke., Hdbk., p. 218; Cke., Illustr., pl. 626 (called *Agaricus* (*Panaeolus*) *phalenarum* by mistake).

*Agaricus fimiputris*, Bull., Champ., t. 66.

On dung. Distinguished amongst the British species of *Anellaria* by the very imperfect ring, which is usually only indicated by a pale zone round the stem. In Bulliard's plate, the pileus in one specimen is broadly expanded, depressed in the centre and margin arched; the gills show a tinge of brownish-red, and there is a tuft of several specimens springing from the same point.

Pileus rather fleshy, conical, then expanded, about 1 in. across, subgibbous, even, glabrous, viscid, smoky-grey or livid; stem 2-4 in. long, 1 line thick, equal, glabrous, becoming pale, with an annular zone above the middle; gills as in *Anellaria separata*, but less ascending. Slenderer than the last-named species, more fragile, and ring incomplete. (Fries.)

#### PANAEOLUS. Fries. (fig. 3, p. 303.)

Pileus slightly fleshy, never striated; gills adnexed, ascending in a conical manner, slate-grey, mottled with the black spores; stem central, smooth, without trace of a ring; spores black.

*Panaeolus*, Fries, Epicr., p. 234; Cke., Hdbk., p. 217; (in both instances as a subgenus of *Agaricus*.)

Distinguished amongst the *Melanosporae* by the even, non-striate pileus and the absence of a more or less evident ring on the stem. In *Psathyrella* the pileus is striate, and the gills altogether black and not mottled; in *Anellaria* there is a ring on the stem, whereas in *Coprinus* the gills deliquesce into a black, inky liquid at maturity.

The pileus remains conical or campanulate, and does not become expanded, hence the margins of the gills ascend and form a hollow cone round the stem.

\* *Pileus viscid, shining when dry.*

**Panaeolus leucophanes.** B. & Br.

Pileus about  $\frac{3}{4}$  in. across, obtuse, campanulate, viscid, shining when dry, white, minutely silky, here and there stained subochraceous; margin appendiculate; gills adnate, pale greyish flesh-colour, then blackish, margin white; stem attenuated upwards, white, about 2 in. high and 1 line thick in the centre, fibrillose and sparingly scattered with mealy particles, hollow, slightly wavy or undulate; spores sub-cymbiform,  $9\ \mu$  long.

*Agaricus (Panaeolus) leucophanes*, B. & Br., Ann. Nat. Hist., n. 1137, pl. 2, f. 1; Cke. Hdbk., p. 218.

In grass fields. Allied to *Anellaria separata*, but smaller and paler in colour and without a ring.

**Panaeolus egregius.** Massee.

Pileus  $1\frac{1}{2}$  in. high by 2 in. broad; ovate-campanulate, smooth, even, viscid when moist, bright orange-brown, disc darker, fleshy, exceeding the gills at the margin, with a trace of agglutinated down on the pileus, slightly wrinkled when dry, flesh 1 line or more thick, ochraceous: stem 5 in. long and  $\frac{1}{2}$  in. or more thick, slightly thickened at the base, solid, fibrillose, readily splitting longitudinally, pale brown without and within, duller than the pileus, white and cottony at the base, smooth at the apex; gills broad,  $\frac{1}{2}$  in. or more at the centre, ventricose, adnexed, crowded, thin, brownish black, edge entire, paler, dry, not deliquescent, spores brown, then blackish, oblong-ovate, with a minute apiculus,  $15-17 \times 7-8\ \mu$ .

*Agaricus (Panaeolus) egregius*, Massee, Grevillea, vol. xiv. p. 91; Cke., Hdbk., p. 218; Cke., Illustr., pl. 624.

On the ground. Solitary; a fine and large species without any close affinity with any known species. There is no trace of a ring. There is just a tinge of purple about the gills at maturity.

**Panaeolus phalaenarum.** Fr.

Pileus 1-2 in. across, rather fleshy, campanulate-convex, obtuse, even, viscid, glabrous, greyish, then yellowish clay-colour, fragments of the veil attached to the margin; gills adnexed,  $\frac{1}{4}$  in. broad, greyish-black; stem 3-5 in. long, 2 lines or more thick, equal, straight or very slightly flexuous, rather

firm, almost naked, pale reddish-pink, hollow; spores elliptical,  $10 \times 6 \mu$ .

*Agaricus (Panaeolus) phalaenarum*, Fries, Epicr., p. 235; Cke., Hdbk., p. 219; Cke., Illustr., pl. 625 (called *Agaricus (Panaeolus) fimiputris* by mistake).

*Agaricus phalaenarum*, Bull., t. 58.

On dung. Closely allied to *Panaeolus papilionaceus*, but larger, the pileus viscid and yellowish clay-colour, like *Anellaria separata*, stem reddish.

Exactly intermediate between *Anellaria separata* and *Panaeolus papilionaceus*; differs from the first in the absence of a ring, and the equal, rufescent stem, the much more convex pileus appendiculate at the margin; the fragments, however, are fugacious and not usually seen; from the latter, present species is known by the veil, viscid pileus, and whitish clay-colour. (Fries.)

**\*\* Pileus not viscid, subflocculose when dry.**

*Panaeolus retirugis*. Fr. (fig. 3, p. 303.)

Pileus about 1 in. across, at first almost globose, then hemispherical, subumbonate, minutely mealy, opaque, moist, furnished with anastomosing raised ribs, pinkish tan-colour; margin with irregular fragments of the veil attached; flesh rather thick; gills adnexed, ascending, 2 lines or more broad, greyish black; stem 2-4 in. long, about 2 lines thick, equal, pruinose, purplish flesh-colour, hollow; spores elliptic-fusiform,  $11-13 \times 7 \mu$ .

*Agaricus (Panaeolus) retirugis*, Fries, Epicr., p. 235; Ck., Hdbk., p. 219; Ck., Illustr., pl. 627.

*Agaricus carbonarius*, Batsch, fig. 91.

On dung. Distinguished amongst the species of *Panaeolus* by the raised ribs on the pileus and its appendiculate margin. The pileus is sometimes greyish, when it approaches *P. phalaenarum*; the latter, however, has the pileus even. Closely resembling, superficially, *Psathyra corrugis*, which is, however, distinguished by the violet-black gills.

Pileus 1-2 in. broad and high, at first obtuse, conic, reticulato-rugulose; at length campanulate, dark cinereous, livid when dry; the ring broken into triangular loops or laciniae, fringing the margin, which is minutely downy and

frequently split. Gills adnate, ascending, mottled, cinereous-black, subdeliquescent; sporules elliptical, subapiculate, brown-black. Stem 2-6 in. high, squamuloso-tomentose, pulverulent, often beaded with little drops, striate above, nearly white, at length rufescent; zoned within. (Berk.)

**Panaeolus sphinctrinus.** Fr.

Pileus  $\frac{3}{4}$ -1 in. across, parabolic, obtuse, opaque, even, glabrous, when moist smoky-black, livid and rather silky when dry, margin at first fringed with fragments of the white veil, flesh thin, pale umber; gills adnate, crowded, about 2 lines broad, greyish-black, edge similarly coloured; stem 2-3 in. long, 1 line thick or more, equal, straight, smoky grey, apex slightly pruinose, base more or less rufous, fragile, hollow.

*Agaricus (Panaeolus) sphinctrinus*, Fries, Epicr., p. 235; Cke., Hdbk., p. 219; Cke., Illustr., pl. 628.

On dung, &c., somewhat resembling *Panaeolus phalaenarum* and *P. papilionaceus*; distinguished from the former by the pileus not being viscid, and from the latter by the grey stem. Fries mentions a small form with linear gills.

Stem fistulose, straight, 2-3 in. long, 1 line thick, equal, fragile, glabrous, smoky-grey, apex even, pruinose. Veil appendiculate near the margin, white, fugacious. Pileus rather fleshy, parabolic, then campanulate, not expanded, obtuse, 1 in. high, hygrophanous, not viscid, hence always opaque, but in rainy weather, moist and smoke-colour or smoky-grey, livid and rather silky when dry, sometimes when in full vigour covered with fibrils, especially near the margin. Gills adnate, ascending, crowded, greyish-black, edge same colour. (Fries.)

**Panaeolus papilionaceus.** Fr.

Pileus  $\frac{3}{4}$ -1 in. across, slightly fleshy, hemispherical, obtuse, glabrous, when dry cracked into minute squamules, pale grey with a tinge of rufous, especially at the disc; gills broadly adnate, 3 lines broad, at length plane, at length blackish; stem 3-4 in. long, 2 lines thick, equal, smooth, whitish, apex powdered with white meal, hollow; spores elliptical, 11-12  $\times$  7  $\mu$ .

*Agaricus (Panaeolus) papilionaceus*, Fries, Epicr., p. 136; Cke., Hdbk., p. 220; Cke., Illustr., pl. 630.

*Agaricus papilionaceus*, Bull., t. 561, f. 2.

On manured ground, dung, &c. At one time confounded with *Panaeolus campanulatus*, but quite distinct although closely allied, and recognised by the much paler hemispherical pileus, paler stem; and broader, broadly adnate gills. The present species is altogether a firmer fungus.

Closely allied to *Panaeolus campanulatus*, but certainly distinct; stem even, whitish, apex even and powdered with white; pileus hemispherical (not campanulate), when dry commonly rimoso-squamoso, dry, pallid; gills broadly adnate, 3-4 lines broad (often broader than long) plane. (Fries.)

\*\*\* *Pileus not viscid smooth, shining, zoneless.*

***Panaeolus campanulatus*. Linn.**

Pileus about  $1\frac{1}{2}$  in. high and broad, rather fleshy, campanulate, often more or less umbonate, not expanded nor splitting, dry, even, glabrous, rather slimy, brown becoming rufescent; gills adfixed, 2 lines or more broad, ascending, grey variegated with black, edge usually whitish; stem 3-5 in. long, 1-2 lines thick, equal straight, every part rufescent, apex striate, at first frosted with white meal, then powdered with the black spores, hollow; spores elliptical,  $8-9 \times 6 \mu$ .

*Agaricus campanulatus*, Linn., Suec., 2, n. 1213.

*Agaricus (Panaeolus) campanulatus*, Fries, Hym. Eur., p. 311; Cke., Hdbk., p. 220; Cke., Illustr., pl. 629.

On the ground where manure is abundant, &c. Allied to *Panaeolus papilionaceus*, but distinguished by the campanulate, more or less umbonate, rufescent stem, and the ascending gills. In rainy weather the stem is often beaded with moisture. Veil exceedingly fugacious.

Stem hollow, straight, commonly 3 in. long, 1-2 lines thick, even, glabrous, rufous, apex distinctly striate, and at first pruinose, then powdered black with the falling spores. Pileus rather fleshy, campanulate, then convex, often umbonate, not cracking, dry, even, rather shining,  $\frac{1}{2}$ -1 in. high and broad, smoky-brown, rufous when dry. Gills adnate, ascending, crowded, grey variegated with black. Veil fugacious, often absent. A much smaller variety also exists. In

both forms the stem is often studded with drops of water in rainy weather. (Fries.)

**Panaeolus caliginosus.** Jungh.

Pileus about  $\frac{3}{4}$  in. high and  $\frac{1}{2}$  in. broad, rather fleshy, obtuse, even, smooth, brown; gills slightly adnexed,  $1\frac{1}{2}$  lines broad, ascending, lanceolate, smoky-black; stem 2-3 in. long, 1 line or more thick, equal, naked, coloured like the pileus, straight, hollow; spores elliptical, blackish,  $10 \times 6-7 \mu$ .

*Agaricus caliginosus*, Junghuhn, Linnea, vol. v. t. vi. f. 13.

*Agaricus (Panaeolus) caliginosus*, Fries, Hym. Eur., p. 312; Cke., Hdbk., p. 220; Cke., Illustr., pl. 631A.

In open pastures amongst grass, &c. Distinguished amongst the smaller species of *Panaeolus* by the brown pileus and stem. Fries says that he has seen a very delicate veil present in this species.

\*\*\* *Pileus not viscid, with a dark-coloured marginal zone.*

**Panaeolus sub-balteatus.** B. & Br.

**Caespitose.** Pileus  $1\frac{1}{4}$ -2 in. across, convex with margin slightly incurved, then expanded, obtuse or slightly umbonate, rather fleshy, hygrophanous, dull, deep fawn-colour, paler when dry, slightly rugose, marked near the margin with a dark, narrow zone; gills brownish, slightly ventricose, adnate, margin white, serrulate; stem 2-2 $\frac{1}{2}$  in. high, 2 lines thick, fistulose, red-brown, brittle, longitudinally fibrous, with short white fibrils; veil none; spores black.

*Agaricus (Panaeolus) sub-balteatus*, B. & Br., Ann. Nat. Hist., n. 923; Cke., Hdbk., p. 220; Cke., Illustr., t. 631B.

On the ground. The dark zone appears to depend on the amount of moisture in the pileus.

**Panaeolus acuminatus.** Fr.

Pileus  $\frac{3}{4}$ -1 in. across, rather fleshy, conical, apex subacute, even, glabrous, shining, yellowish clay-colour with a flesh tinge, with a dark encircling zone near the uneven margin; gills adnexed,  $1\frac{1}{2}$  line broad, ventricose, crowded, at length black; stem 1-1 $\frac{1}{2}$  in. long,  $1\frac{1}{2}$  line thick, equal, pale upwards, brownish towards the base, pruinose, hollow.

*Agaricus (Panaeolus) acuminatus*, Fries, Epicr., p. 237; Cke., Hdbk., p. 220; Cke., Illustr., pl. 632A.

On dung and amongst grass by roadsides, &c.

Stem 1 in. long, ("up to 3 in."), whitish, fuscous below, base incrassated. Pileus large in proportion, fleshy-clay-colour, ("foxy-violet" Secr.), margin at first crenulated. (Fries.)

**Panaeolus fimicola.** Fr.

Pileus  $\frac{1}{2}$ – $\frac{3}{4}$  in. across and high, slightly fleshy, campanulato-convex, obtuse, glabrous, opaque, dingy grey when moist, paler and yellowish when dry, with a narrow brown encircling zone near the margin; gills adnate, 2 lines or more broad, grey, variegated with smoky-black; stem 2–4 in. high, 1 line or more thick, equal, fragile, whitish, powdered with white meal upwards, hollow.

*Agaricus (Panaeolus) fimicola*, Fries, Syst. Myc. i. p. 301; Cke., Hdbk., p. 221; Cke., Illustr., pl. 632 b.

*Agaricus varius*, Bolton, t. 66, f. 1.

On dung and in rich pastures, &c.

Stem soft, fragile, obsoletely silky-striatulate, 2–4 in. long. Pileus when moist commonly smoky-grey, when dry greyish clay-colour, sometimes discoid. Gills semi-ovate with a minute decurrent tooth. (Fries.)

**Panaeolus cinctulus.** Bolton.

Pileus 1–2 $\frac{1}{2}$  in. across, campanulate, then expanded, smooth, even, reddish cinnamon colour with a band  $\frac{1}{4}$ – $\frac{1}{2}$  in. broad of a dark brown colour near to or quite up to the margin; flesh  $\frac{1}{4}$  in. and more thick at the disc, gradually tapering to the margin of the pileus, which extends beyond the gills; the dark brown colour of the band on the pileus permeates the flesh; gills rather close, free, ventricose, 2 lines and more broad, dusky-black; stem 3–5 in. high, 2 lines and more thick, equal, hollow, dingy brown within and without.

*Agaricus cinctulus*, Bolton, Hist. Fung. Halifax, p. 152, t. 152.

*Panaeolus fimicola*, var. *cinctulus*, Cke., Hdbk., p. 221.

On dunghills. The above description is drawn up from Bolton's figure and description, and appears to be quite distinct from any described species. The fungus is probably a *Panaeolus* as suggested by the margin of the pileus being continued beyond the gills, but the flesh is thicker than usual in the *Melanosporae*.

The root is small, tough, but the fungus will numerous fibres.

The stem is cylindrical, and the gills are broad within and without: it is black, and the gills are filaments.

The gills are arranged in two rows, but are very broad in the middle, and the colour is a dusky black, the substance being soft.

The pileus is convex, it is a little flattened with a broad belt of a dark brown, which is only on the surface, but beneath is white, shining, of the pileus; in young dark brown, but wanting (= the dark zone, which is wanting in the pileus).

Grows on damp, moist, and fertile soil.

### PSATHYRELLA

Stem central: pileus immixtum, gills straight and pressed to the base, with some beyond the free, adpressed, or some, persistent, or (rescent) gills: vel immixtum, some, large.

Agaricus, subgen. *Psathyrella*, Hdbk., p. 221.

Distinguished from *Psathyrella* by the straight pileus, and from *Coprinus* by the persistent, or (rescent) gills. The stem is large, fusiform, and is distinguished by the subglobose, or large, fusiform spores.

The present genus is included in the *Psathyrellaceae*, or brown colour of the spores is characteristic.

\* Stem straight, and not branched.

### *Psathyrella substricta*

Pileus 1-1½ in. across, then expanded, convex, margin, often rugose, becoming pale; gills becoming pale; stem 4-6 in. high, then blackish; stem 4-6 in. high, then blackish.



low, straight, rather firm, rather silky and shining, white, then pallid, naked.

*Ag. (Psathyrella) substratus*, Fries, *Epicr.*, p. 238; Cke., *Hdbk.*, p. 221; Cke., *Illustr.*, pl. 633.

Amongst grass, &c.

In the typical form the stem is 4-5 in. long, in form *media* 2-3 in., in form *minor* little more than 1 in.; pileus subumbonate, fuliginous when moist, subolivaceous; gills ventricose, 2 lines broad. (Fries.)

Tufted. Pileus fleshy, brown-orange, paler at the margin, when young sericeous, 2-5 in. broad, convex, sometimes glutinous, rarely scaly. Lamellae adnate, rather broad, pale, greyish, at length somewhat greenish, numerous. Stipes 2-5 in. long, about  $\frac{1}{2}$  in. thick, firm, cylindrical, crooked, scarcely quite solid, but filled with a fibrous spongy mass. Flesh yellowish-white. Veil fugacious, staining the stipes more or less. Taste bitter. (Grev.)

#### *Psathyrella gracilis*. Fr.

Pileus  $\frac{3}{4}$ -1 in. across, submembranaceous, conical, then expanded, slightly striate when moist, hygrophanous, brownish when moist, pale dingy yellow or tinged with rose-colour when dry and without striae; gills broadly adnate, about 2 lines broad, rather distant, broadest behind, greyish-black; margin with a slight rosy tint; stem about 3 in. long, 1-1 $\frac{1}{2}$  lines thick, straight, naked, pallid, hollow; spores elliptical,  $7 \times 3-3.5 \mu$ .

*Agaricus (Psathyrella) gracilis*, Fries, *Syst. Myc. Eur.* i. p. 299; Cke., *Hdbk.*, p. 221; Cke., *Illustr.* pl. 634.

On banks under hedges, &c. Fries says that a corrugated variety exists that very much resembles *Psathyra corrugis*. In Cooke's figures the stem is represented as being attenuated into a rooting base.

Gregarious, fragile owing to its rigidity. Stem hollow, very straight, 3 in. long and more, scarcely a line thick, equal, naked, glabrous, whitish, base rootless, furnished with white down. Pileus membranaceous, campanulate, obtuse,  $\frac{1}{2}$ -1 in. broad, glabrous, even, slightly pellucidostriate towards the margin, smoky, livid, &c., but hygrophanous; when dry clay-colour, rosy, or whitish, soft to the touch. Gills broadly adnate, generally broadest behind

(rarely linear), almost distant, at first whitish, then from the black spores greyish-black, edge rose-colour. (Fries.)

**Psathyrella hiascens.** Fr.

Pileus about 1 in. across, membranaceous, campanulate, glabrous, sulcate and splitting, disc even, brownish, the remainder pallid or greyish; gills attached to the stem, rather distant, broadest behind, pale, then blackish; stem  $1\frac{1}{2}$ –2 in. long,  $1$ – $1\frac{1}{2}$  lines thick, straight or slightly curved at the base, brittle, rigid, glabrous, white, hollow; spores elliptical,  $7 \times 3.5 \mu$ .

*Agaricus* (*Psathyrella*) *hiascens*, Fries, Syst. Myc. i. p. 303; Cke., Hdbk., p. 222; Cke., Illustr., pl. 635.

Under hedges, damp woods, &c.

With the habit of a *Coprinus* of the *Veliformes* section, but distinguished by its rigidity, and by the dry gills. Stem fistulose, 3 in. long, 1 line thick, straight, rigid, and fragile, glabrous, naked, whitish. Pileus membranaceous, conico-campanulate, obtuse, 1 in. high, glabrous, livid, then yellowish, soon (usually up to the middle) with gaping fissures as in the slender species of *Coprinus*, but dry and persistent, not diffuent, margin at length splitting and revolute. Gills adnate, narrow, linear or subattenuated in front, distinct, distant, whitish, then black, at length very black. Spores black. (Fries.)

**Psathyrella arata.** Berk. (fig. 14. p.303.)

Pileus  $\frac{3}{4}$ –1 in. across, membranaceous, campanulato-conic, rather acute, margin coarsely and deeply sulcate, brown, paler when dry; gills free, lanceolate, slightly broadest in front, black with a tinge of purple; stem 4–5 in. long, slender, gradually and slightly attenuated upwards, white, smooth, even, hollow.

*Agaricus* (*Psathyrella*) *aratus*, Berk., Outl., p. 176; Cke., Hdbk., p. 222; Cke., Illustr., pl. 636.

Under hedges, &c.

With somewhat the habit of *Psathyrella substrata*, but distinguished from this and every other species by the pale brown pileus having the margin coarsely sulcate, and the long, white, tapering stem.

**Psathyrella trepida.** Fr.

Pileus about 1 in. across, membranaceous, campanulate,

margin sometimes rather wavy, obtuse, glabrous, disc even, very closely striatulate, hygrophanous, fuliginous, apex fuscous; gills adnate, crowded, 1 line or more broad, ventricose, thin, sooty-black; stem 3 in. long, straight or slightly wavy, glabrous, 1-1½ lines thick, equal, whitish, glabrous, pellucid, hollow.

*Agaricus (Psathyrella) trepidus*, Fries, Epicr., p. 238; Cke., Hdbk., p. 222; Cke., Illustr., pl. 655 A.

In muddy marshes and damp places. Very fragile, stem usually rather wavy; pileus with closely-crowded but not deep striae.

Stem fistulose, 3 in. long, almost 1 line thick, equal, straight (rarely flexuous), glabrous and naked, diaphanous, hyaline. Pileus membranaceous, very fragile, campanulate, obtuse, 1 in. and more across, glabrous, disc even, spadiceous, the remainder densely striatulate, fuliginous. Gills adnate, crowded, ventricose, very thin, smoky-black. Spores black. (Fries.)

***Psathyrella hydrophora*. Bull.**

Pileus 1 in. and more across, membranaceous, campanulate, then expanded, the striate margin becoming upturned, glabrous, disc broad, even, rufous, remainder paler; gills adnate, crowded, about 1 line broad, livid, then black; stem 2½-3 in. high, ascending and straight from a curved base, smooth, white, hollow, often beaded with minute drops of water.

*Agaricus (Psathyrella) hydrophorus*, Fries, Hym. Eur., p. 314; Cke., Hdbk., p. 222; Cke., Illustr., pl. 655 B.

*Agaricus hydrophorus*, Bull., Champ., t. 558, f. 2.

On the ground in gardens, &c.

Intermediate between the present genus and *Coprinus*, but the gills are not truly diffuent.

Stem fragile, straight, 3 in. long, 1 line or a little more in thickness, glabrous, in rainy weather beaded with moisture, white, veil fugacious, at first appendiculate. Pileus submembranaceous, conico-campanulate, obtuse, then expanded and revolute, glabrous, disc even, margin striate, rufescent. Gills adnate, ascending, crowded, narrow, linear, livid-black, edge of the same colour. (Fries.)

**\*\* Stem more or less flexuous, apex mealy.**

**Psathyrella caudata. Fr.**

Pileus  $1\frac{1}{2}$ –2 in. across, membranaceous, conico-campanulate, margin striate, hygrophanous, dry, disc even, pale ochraceous; gills adnate, then adnexed, 2 lines or more broad, greyish-black; stem 3–5 in. long, 2 lines thick, equal, often wavy, whitish, hollow, attenuated into a rooting base.

*Agaricus (Psathyrella) caudatus*, Fr., Obs. ii. p. 187; Cke., Hdbk., p. 222; Cke., Illustr., pl. 637.

In gardens, &c.

Very fragile. Stem 3 in. and more in length, about 2 lines thick, apex obsoletely pulverulent. Pileus when expanded 2 in. across, dry, not rugose, clay-colour, with a tinge of flesh-colour, splitting and almost deliquescent in rainy weather. (Fries.)

A condition of the present species is described as follows by Berk. & Broome. A small form. Pileus at first sienna-brown, at length whitish, often transversely cracked; stem at first white, fibrillose; gills ventricose, adnate.

Stem fistulose, 3 in. and more long, almost 2 lines thick, attenuated from the thickened rooting-base, very fragile, curved, at length tortuous, surface undulated, apex powdered with white meal, pallid-white. Veil none. Pileus membranaceous, very delicate, conical, then campanulate, at length expanded and 2 in. or more broad, glabrous, disc subgibbous, even, the remainder pellucid, striate, not corrugated, spadiceous; in moist weather splitting and subdeliquescent; quite firm in dry weather, clay-colour with a tinge of flesh-colour. Gills adnate, 4 lines broad, distinct, greyish-black, edge similarly coloured. Habit almost that of *P. gracilis*, but abundantly distinct. Spores black when thrown on white paper, on black paper blackish-brown. (Fries.)

**Psathyrella pronus. Fr.**

Pileus  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, membranaceous, hemispherical, obtuse, striate, hygrophanous, opaque and minutely silky-atomate when dry, pale smoky-ochraceous; gills adnate, rather distant, ventricose, 1 line or more broad, greyish-black; stem about  $1\frac{1}{2}$  in. long,  $\frac{1}{2}$  line thick, equal, rather wavy, whitish, semi-pellucid, minutely hollow; spores elliptical,  $10 \times 4-5 \mu$ .

*Agaricus (Psathyrella) pronus*, Fries, *Epicr.*, p. 239; Cke., *Hdbk.*, p. 223; Cke., *Illustr.*, pl. 656 A.

Amongst grass. Often tufted, fragile.

Stem filiform, lax, yet fragile,  $1\frac{1}{2}$  in. long, apex obsoletely pruinose, remainder very glabrous. Pileus 4-6 lines broad, smoky, hoary when dry. Gills subtriangular, margin sometimes obsoletely rosy. Spores very black. (Fries.)

*Var. Smithii*, Mass. Pileus 2 lines across, hemispherical, stem  $1\frac{1}{2}$  in. high, filiform, pallid, gills broad in proportion. Cke., *Illustr.*, pl. 656 B.

On the ground in woods (Worth. G. Smith).

Stem distinctly fistulose,  $1\frac{1}{2}$  in. long, filiform, flexuous, lax, equal, very smooth, apex pruinose under a lens, becoming pallid. Pileus membranaceous, campanulate, then hemispherical, very obtuse, 4-6 lines broad, glabrous, pellucidostriate, hygrophanous, fuliginous when moist, hoary when dry, obsoletely minutely silky-atomate. Gills adnate, plane, subtriangular, distant, 2 lines broad, livid-fuliginous, spotted with black with the spores. (Fries.)

***Psathyrella empyreumatica*. B. & Br.**

Pileus  $1\frac{1}{2}$  in. across, expanded, hygrophanous, atomate, rufous, becoming pale, margin crenate; gills 2 lines broad, connected by veins, thick, distant, adnate with a decurrent tooth, rufous, then brown-purple, margin pale; stem 2-2 $\frac{1}{2}$  in. high,  $1\frac{1}{2}$  lines thick, minutely fistulose, silky-furfuraceous, pale. Strong-scented.

*Agaricus (Psathyrella) empyreumaticus*, B. & Br., *Ann. Nat. Hist.*, n. 1262; Cke., *Hdbk.*, p. 223; Cke., *Illustr.*, t. 657 A.

On a wooden pavement.

Resembling *Ag. confragosus* (= *Pholiota confragosa*) so closely that, till the spores were observed, it was taken for that species. (B. & Br.)

***Psathyrella atomata*. Fr.**

Pileus about 1 in. across, submembranaceous, campanulate, obtuse, then expanded, indistinctly striate at the margin, hygrophanous, when dry rugulose and covered with glistening particles, not torn, pale ochraceous, often tinged with rose-colour; gills adnate, rather distant, about  $1\frac{1}{2}$  line broad, margin minutely and irregularly toothed, greyish,

then black; stem about 2 in. long, 1 line or more thick, rather wavy, hollow, white, apex mealy; spores elliptical,  $10 \times 4 \mu$ .

*Agaricus (Psathyrella) atomatus*, Fries, Syst. Myc. i. p. 298; Cke., Hdbk., p. 223; Cke., Illustr., pl. 638.

On the ground under hedges, bushes, &c.

Pileus resembling that of *Psathyrella gracilis*, livid and becoming tinted with rose-colour or whitish, but more fragile than the last-named fungus; stem not straight, shorter (2 inches), rootless, not glabrous. Gills ventricose, rather distant, edge coloured like the rest or whitish. (Fries.)

Stem hollow, 2 inches long, about 1 line thick, equal, not rooting, even, slightly wavy (not straight), white, apex powdered with white meal. Pileus membranaceous, obtuse,  $\frac{1}{2}$ –1 in. broad, lightly striatulate, becoming livid, striae absent when dry, rugulose, powdered with shining atoms, clay-colour or pallid-pinkish, sometimes reddish. Gills adnate, broad, ventricose, rather distant, whitish, but from the black spores greyish-black. (Fries.)

***Psathyrella crenata*. Lasch.**

Pileus  $\frac{1}{2}$ –1 in. across, membranaceous, hemispherical, obtuse, margin crenate, sulcate half way up, hygrophanous, whitish with a tinge of yellow, disc darker, and atomate when dry; gills adnate, rather ventricose, rather broad, yellow-brown, then blackish; stem  $1\frac{1}{2}$ –2 in. long, 1–2 lines thick, slightly curved near the base, fragile, whitish, striate and mealy above, hollow; spores elliptical,  $11\text{--}13 \times 5\text{--}6 \mu$ .

*Agaricus (Psathyrella) crenatus*, Lasch, in Fries, Hym. Eur., p. 315; Cke., Hdbk., p. 223; Cke., Illustr., pl. 847. Amongst grass.

Fragile. Stem  $1\frac{1}{2}$  in. long. Pileus  $\frac{3}{4}$ –1 in. broad, ochraceous or rufescent, becoming pale. (Fries.)

Distinguished by the coarsely sulcate pileus and crenate margin.

***Psathyrella disseminata*. Pers. (fig. 4, p. 303.)**

Densely tufted. Pileus about  $\frac{1}{2}$  in. across, membranaceous, ovate-campanulate, at first scurfy then naked, coarsely striate, margin entire, yellowish then grey; gills adnate,

narrow, whitish, then grey, finally blackish; stem 1-1½ in. long, rather curved, mealy then smooth, fragile, hollow.

*Agaricus (Peathyrella) disseminatus*, Pers., Syn., p. 403; Cke., Hdbk., p. 223; Cke., Illustr., pl. 657 B.

About trunks of trees, and on the ground. Forming large, dense tufts; very slender and fragile, soon flaccid, but not deliquescent.

Crowded. Pileus ovate, conical, at length campanulate, ½-¾ in. from the base to the apex, striate and plicate, membranaceous, pale buff or reddish-brown, at length grey, becoming flaccid and dissolving. Lamellae distant, narrow, pale brown. Stipes 1-3 inches long, slender, weak, brittle, crooked, hollow, pale yellowish, whitish or greyish. Particularly partial to old willow-trees, and when growing on a stump of a felled tree often covering nearly a square yard. (Grev.)

#### GOMPHIDIUS. Fries. (figs. 7-9, p. 303.)

Stem central, expanding gradually and without differentiation into the fleshy pileus; gills decurrent, distant, soft, rather mucilaginous, edge acute; veil floccose, viscid, forming an imperfect ring round the stem; spores large, elongato-fusiform, smoky-olive; cystidia large.

*Gomphidius*, Fries, Epicr., p. 319; Fries, Hym. Eur., p. 399; Cke., Hdbk., p. 284.

A very distinct genus, characterised by the peculiar tough, elastic substance of the entire fungus, pileus glutinous when moist, as is also the floccose veil; gills decurrent, generally more or less tinged with dingy olive at maturity, soft and mucilaginous. Spores very large, elongated and narrowly fusiform, dingy olive, in form resembling those characteristic of the species of *Boletus*; a genus without close affinities, and might with equal reasons have been placed in any other group with coloured spores. Fries says, from the habit, its position is between *Cortinarius* and *Hygrophorus*.

#### *Gomphidius glutinosus*. Schaeff.

Pileus 2-5 in. across, obtuse, margin for a long time incurved, glutinous, purplish-brown or fulvous, flesh thick except at the incurved margin, white; veil viscid; gills

rather distant, about 2 lines broad, slightly decurrent, whitish, then grey, finally greenish-olive; stem 2-4 in. long  $\frac{1}{2}$ - $\frac{3}{4}$  in. thick, subequal, whitish, ring indistinct, solid, flesh white except towards the base, where it is yellow; spores elongato-fusiform, smoky-olive,  $18-20 \times 6 \mu$ .

*Gomphidius glutinosus*, Fries, Syst. Myc. i. p. 315; Cke., Hdbk., p. 284; Cke., Illustr., pl. 879.

In fir woods.

Pileus 2-5 in. broad; gills truly branched; stem 2-3 in. or more high,  $\frac{1}{2}$  in. thick, dirty white, the base thickened and yellow, sometimes adorned with black scales. (Fries.)

The whole fungus is elastic, pileus glutinous, stem often also viscid from the remains of the viscid veil; gills more or less decurrent (said by Fries to be adnexed). Distinguished by the bright yellow flesh at the base of the stem.

***Gomphidius viscidus*. Fr. (fig. 7-9, p. 303.)**

Pileus 2-6 in. broad, viscid, convex then depressed round the disc and obtusely umbonate, margin acute, reddish-brown, flesh thick, pale yellowish-brown; gills rather distant, decurrent, elastic, branched, becoming purplish-umber with an olive tinge; stem 3-5 in. long,  $\frac{3}{4}$ -1 in. thick, subequal or slightly ventricose, pale yellow-brown, more or less floccose, ring imperfect, solid, flesh yellowish-brown, deepest at the base; spores elongato-fusiform,  $18-20 \times 6 \mu$ .

*Gomphidius viscidus*, Fries, Syst. Myc. i. p. 315; Cke., Hdbk., p. 284; Cke., Illustr., pl. 881.

Under fir-trees, &c.

Stem rhubarb-colour within; pileus 2-3 in. diameter, stem 3-4 in. long,  $\frac{1}{2}$  in. thick, but these dimensions are often exceeded, gills pallid then greenish, at length purple-umber. (Cooke.)

Pileus 2-3 in. broad, top-shaped, umbonate, yellow in the centre, the margin liver-coloured, shining; gills decurrent, somewhat branched, firm, elastic, thick, entire, purple-brown, the shorter connected with the longer; spores dark, fusiform. Stem 3 in. high,  $\frac{1}{2}$ - $\frac{3}{4}$  in. thick, rhubarb-coloured without and within, fibrillose, attenuated below, firm, solid, slimy from the remains of the veil, which forms an obsolete filamentous ring. (Berk.)



**Gomphidius maculatus.** Scop.

Pileus about 3 in. across, fleshy, convex, viscid, whitish, spotted when old with black, flesh thick, white; stem shorter than diameter of pileus, firm cylindrical, yellow, flesh reddish; gills decurrent, thick, branched, umber.

*Gomphidius maculatus*, Fries, Epicr., p. 319. Cke., Hdbk., p. 284.

*Agaricus maculatus*, Scopoli, Carm. ii. p. 448.

*Gomphidius stillatus*, Straus, in Sturm, fasc. 33, t. 2.

In woods. It is doubtful whether the above species is in reality a member of the British flora; it is introduced on the authority of specimens found and figured by Cooke which are considered to be a variety of the above, but which differ so much that as species are at present understood in the genus *Gomphidius*, it appears to be as distinct as any other described; however, in deference to Cooke's opinion the supposed variety will be considered as such, and as Cooke did not give it a distinctive name, it may be named and described as follows.

**Var. Cookei.** Mass.

Pileus 1-2 in. across, convex, then either subdepressed or gibbous, viscid, whitish, with black stains especially near the margin, flesh thick in the centre, very thin towards the margin; gills decurrent, distant, about  $1\frac{1}{2}$  line broad, whitish then brownish; stem 3 in. long,  $\frac{1}{2}$  in. thick at the apex, attenuated downwards, pale above becoming blackish towards the base, flesh dark at the base, solid; spores  $20 \times 5-6 \mu$ .

*Gomphidius maculatus*, var., Cke., Illustr., pl. 882.

In woods.

The form figured in "Illustrations" differs from the type in the longer stem, which is not yellow, but is attenuated and turns blackish at the base. Pileus 2 in.; stem 3 in. or more long. (Cooke.)

**Gomphidius roseus.** Fr.

Pileus 1-2 in. across, obtuse or often slightly depressed when old, glutinous, varying from pale pink to bright rose-red colour, flesh thick except at the margin, whitish; veil thick, filamentous; gills 1 line or more broad, decurrent,

rather distant, forked, whitish-grey, finally olive; stem  $1\frac{1}{2}$ –2 in. long,  $\frac{1}{2}$ – $\frac{2}{3}$  in. thick, whitish, more or less attenuated downwards, whitish, ring imperfect, solid, flesh more or less tinged with red at the base; spores smoky-olive, elongato-fusiform,  $16\text{--}18 \times 7 \mu$ .

*Gomphidius roseus*, Fries, Hym. Eur., p. 400; Cke., Illustr., pl. 880.

*Gomphidius viscosus*, var. *B. roseus*, Cke., Hdbk., p. 284.

In woods.

Pileus 2 in. broad, plano-convex, very slimy, of a beautiful strawberry colour, shining when dry with a satiny lustre. Gills albedo-cinereous, very decurrent, forked, distant; veil thick, filamentous and coloured within by the spores. Stem attenuated downwards, solid but spongy, silky with a pale tinge of rose. (Berk.)

***Gomphideus gracilis*. Berk.**

Pileus about 1 in. across, conical, then hemispherical, sometimes depressed round the disc and subumbonate, vinous-brown or dingy tan-colour, covered with a smoke-coloured gluten which leaves blackish spots in drying, chiefly near the margin; gills decurrent, forked, about  $1\frac{1}{2}$  line broad, thick, whitish then pale bistre, becoming blackish; stem  $1\frac{1}{2}$ –2 in. long,  $\frac{1}{4}$  in. thick at the apex, often thinner downwards, flexuous, pallid, with whitish squamules above, virgate below, base yellow, solid, ring obsolete; spores dingy olive, elongato-fusiform,  $16\text{--}18 \times 5 \mu$ .

*Gomphidius gracilis*, Berk., Outl., p. 196, t. 12, f. 7; Cke., Hdbk., p. 285; Cke., Illustr., pl. 883.

In fir woods.

Pileus 1 in. across, conico-subhemispherical, of a pale vinous-brown, when dry clothed with dirty fuliginous slime, which dries, especially round the margin, into black spots, or forms a narrow, irregular black border. Stem 2 in. high,  $1\frac{1}{2}$  line thick, flexuous, pale, especially above, where it is sprinkled with minute white scales, virgate below, with the remains of the slime, yellow at the base; gills arched, decurrent, forked, thick, obtuse, clothed under a lens with short tomentose hairs, of a washy bistre. (Berk.)

## PORPHYROSPORAE.

The species included in the present group are closely allied to those of the Melanosporae, but are distinguished by a more or less distinct violet or purple tinge in the epispore at maturity, which gives to the mature gills, as also to the spores in the mass, a purple tinge.

The gills are persistent, and do not deliquesce at maturity, as in the genus *Coprinus*.

The simplest types of structure, as resupinate or lateral stemmed species, are absent from the present group, as are also species, with decurrent gills. On the other hand, we meet with generic types of a higher order than in the Melanosporae, as in *Agaricus*, where the gills are free, and a well developed secondary veil is present, forming a persistent ring on the stem; in *Chitonina* the gills are also free, and a large, persistent volva sheaths the base of the stem. Finally, in many species of *Hypholoma*, *Stropharia*, and *Agaricus*, the flesh of the pileus is very thick and compact.

## ANALYSIS OF THE GENERA.

\* Gills attached to the stem.

† Ring imperfect or absent.

**Psathyra.**—Stem fragile; margin of pileus straight when young; veil obsolete.

**Psilocybe.**—Stem tough; margin of pileus incurved when young; veil obsolete.

**Hypholoma.**—Veil attached in fragments to margin of pileus (appendiculate); ring fibrillose or absent.

†† Ring interwoven (forming a membrane), persistent on the stem.

**Stropharia.**



FIGURES ILLUSTRATING THE PORPHYROSPORAE.

Fig. 1, *Agaricus campestris*, section of portion of fungus, showing the free gills and the ring surrounding the stem; about half nat. size;—Fig. 2, *Agaricus comptulus*, a fully developed specimen; nat. size;—Fig. 3, *Stropharia aeruginosa*; half nat. size;—Fig. 4, *Chitonina rubriceps*, a specimen showing the large volva at the base of the stem; nat. size;—Fig. 5. section of pileus of same, showing the free gills and the hollow stem; nat. size;—Fig. 6, *Pilosace Algeriensis*, section of a portion of the pileus, showing the free gills and the tissue of the stem differentiated from

**\*\* Gills free from the stem.**

**Pilosace.**—Volva and ring both absent.

**Agaricus.**—(= *Psalliota*, Fr.) ring on stem present; volva absent.

**Chitonina.**—Volva at base of stem present; ring absent.

**PSATHYRA.** Fries. (figs. 13 and 15, p. 351).

Pileus submembranaceous, conical or campanulate, then expanded, margin at first straight and pressed to the stem; stem central, polished, rather cartilaginous and fragile, hollow; gills purplish or brownish, as are also the spores; veil absent or only universal and floccose or fibrillose.

*Agaricus*, subgen. *Psathyra*, Fries, *Epicr.*, p. 231; Cke., *Hdbk.*, p. 213; Fries, *Hym. Eur.*, p. 304.

Slender, fragile, hygrophanous. There are a few tough species analogous to the tough species of *Psilocybe*. The genera included in the *Melanosporae* are distinguished by the gills being pale or grey at first, then black, and not brown or purplish.

Veil universal, fibrillose, or entirely absent. Pileus submembranaceous, conical or campanulate, margin at first straight and pressed to the stem. Corresponds to *Mycena*, *Nolanea*, and *Galera*. Closely allied to *Psathyrella*, from which the present is distinguished by the brown spores (not black) and the brown or purplish gills. All the species are terrestrial or grow on trunks, slender, hygrophanous. (Fries.)

that of the pileus; nat. size of a small specimen;—Fig. 7, spores of same; highly mag.;—Fig. 8, *Stropharia melasperma*, section showing the adnate gills and ring on the stem; nat. size;—Fig. 9, *Hypholoma hypoxanthus*; small specimen nat. size;—Fig. 10, *Hypholoma oedipus*, entire fungus; nat. size;—Fig. 11, *Psilocybe udus*, entire specimen; nat. size;—Fig. 12, section of same, showing adnate gills; nat. size;—Fig. 13, *Psathyra gyroflexa*, group of plants; nat. size;—Fig. 14, *Hypholoma oedipus*, section of pileus; nat. size;—Fig. 15, *Psathyra urticaeaeola*; nat. size;—Fig. 16, *Hypholoma sublateritius*, basidium and spores; highly mag.;—Fig. 17, *Stropharia semiglobata*, section; half nat. size.



I. CONOPILE. *Pileus* often free, ascending, rich, str. grassy or moist places.

***Psathyra elata* Hbn.**

*Pileus* 1-1½ in. across, panulate, very symmetrical, becoming pale ochraceous, atomate, perfectly even all over, about 2 lines broad, slightly at the base, slightly perfectly straight, hollow, pale brown, purple tinge, 18 x

*Agaricus (Psathyra) conopsea* Hbn., Cke., Hdbk.

Amongst grass to be a variety of a distinct species, broadly adnate

***Psathyra conopsea* Hbn.**

*Pileus* about 1 in. across, panulate, even, ochraceous when dry, brown; stem upwards, glabrous, wavy, hollow; slight

*Agaricus conopsea* Hbn., p. 215

In grassy places the *pileus* is ochre when dry of the *pileus* all

***Psathyra mastige* Hbn.**

*Pileus* 1-1½ in. across, then conico-panulate, usually wavy, fleshy, even; margin pale, red

lines thick, attenuated upwards, white, smooth or fibrillose and purpuraceous, fistulose, paler than the pileus; spores elliptical.

*Agaricus (Psathyra) mastiger*, B. & Br., Ann. Nat. Hist., n. 921; pl. xiv. f. 6; Cke., Hdbk., p. 213; Cke., Illustr., t. 591 A.

Amongst grass on roadsides, &c. Allied to *P. conopileus*, but known by the large mammiform umbo and the rich brown colour when moist.

***Psathyra glareosa*. B. & Br.**

Pileus campanulate, obtuse or umbonate,  $\frac{1}{2}$  in. across, grey, apex pale chestnut, striate, very minutely tomentose; gills broad behind, adnate, umber; stem 1-2 in. high, 1 line thick, fistulose, brown with white fibrils.

*Agaricus (Psathyra) glareosa*, B. & Br., Ann. Nat. Hist., n. 2011; Cke., Hdbk., p. 213; Cke., Illustr., t. 591 B.

On gravelly soil after wet weather. Flesh brown, especially close to the gills.

***Psathyra corrugis*. Pers.**

Pileus 1-2 in. across, submembranaceous, campanulate, umbonate, rather radially rugulose, very pale ochraceous often tinged with pink; gills sinuate, adnexed, ventricose, violet black; stem 2-3 in. long, 2-3 lines thick, equal, smooth, white, hollow; spores elliptical,  $12-14 \times 6 \mu$ .

*Agaricus corrugis*, Pers., Syn., p. 424; Fries, Hym. Eur., p. 305; Cke., Hdbk., p. 214; Cke., Illustr., pl. 576.

In pastures.

Pileus 1 in. or more broad, turning pale, corrugated when dry. Gills broad. Stem 2-4 in. high, 1-2 lines thick, smooth; cottony at the base. (Fries.)

**Var. *vinosus*.** Corda in Sturm, 19, t. 4. Cke., Illustr., pl. 592.

Pileus with a rosy tinge, stem short.

In gardens, &c.

**Var. *gracilis*.** Bull., t. 561, f. 1; *Agaricus pellosperrus*, Cke., Illustr., pl. 577.

More slender than the type.

The above varieties appear to be nothing more than mere forms of the type species.

**Psathyra gyroflexa.** Fr. (fig. 13, p. 351.)

Pileus  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, membranaceous, conico-campanulate, deeply striate half way up the pileus, atomate, becoming very pale grey, disc rufescent, gills adnexed, crowded, soft, narrow, greyish-purple; stem  $1\frac{1}{2}$ –2 in. long, about 1 line thick, equal, white silky, shining, hollow, flexuous; spores elliptical,  $10 \times 6 \mu$ .

*Agaricus gyroflexus*, Fries, Epicr., p. 232; Cke., Hdbk., p. 214; Cke., Illustr., pl. 970.

Amongst grass, &c. Scattered or usually subcaespitose. Distinguished by the slender wavy stem and rather coarsely striate pileus. With the habit of *Psathyrella disseminata*.

Stem fistulose, formed of two tubes, very fragile, tortuous, surface undulated, 2 in. long and more, scarcely 1 line thick, dry, glabrous, shining, white. Pileus submembranaceous, conical then campanulate, obtuse,  $\frac{1}{2}$  in. broad, glabrous, pallid-white, margin striate. Gills adnate, ascending, broad, greyish-purple. (Fries.)

## II. OBTUSATI. *Pileus campanulato-convex, expanded, glabrous or atomate; gills plane or arcuato-adfixed; veil absent.*

**Psathyra spadicio-grisea.** Schaeff.

Pileus  $1$ – $1\frac{1}{2}$  in. across, submembranaceous, conical then campanulate, becoming expanded, glabrous, striate to the middle, hygrophanous, bay then greyish; gills adnexed, rather crowded, narrow, brownish; stem  $1\frac{1}{2}$ –2 in. long, 1–2 lines thick, usually curved, firm subequal or attenuated upwards, white, shining, apex striate, hollow.

*Agaricus spadiceo-griseus*, Schaeffer, Icon., t. 237; Cke. Hdbk., p. 214; Cke., Illustr., pl. 611.

On chips, also on and near trunks, &c. Subcaespitose or solitary, watery, fragile. With the habit and general structure of a *Psathyra*, but departing from the specific character in the persistent brown colour of the gills.

Solitary or gregarious; often large numbers springing from the same point, but not connate. Stem hollow, 3 in. long, 2 lines thick, equal, whitish, shining, apex striate, sometimes powdery. Pileus submembranaceous, very fragile, campanulate then convex, at length expanded, obtuse, glabrous, even, but owing to the translucent nature



of the pileus, striate to the middle when moist, 2 in. and more broad, very hygrophanous, bay when moist, greyish-white when dry; gills attenuated behind, adnexed, crowded, narrow, at first ascending, then plane, umber-brown.

***Psathyra obtusata*. Fr.**

Pileus  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, submembranaceous, broadly campanulate, obtuse, glabrous, corrugated, hygrophanous, rather shining, umber, margin paler, every part paler when dry; gills adnate, rather distant, slightly ventricose, pale then umber; stem 1–2 in. long, rather rigid, about  $1\frac{1}{2}$  line thick, equal, almost naked, whitish, usually incurved at the base, hollow; spores elliptical,  $6-7 \times 4 \mu$ .

*Agaricus (Psathyra) obtusatus*, Fries, Syst. Myc. i. p. 293; Cke., Hdbk., p. 215; Cke., Illustr., pl. 593.

On trunks and on the ground. Solitary or tufted. Berkeley says that the stem is rooting.

Stem fragile, fistulose, 2–3 in. long, 1–2 lines thick, round, equal, silky-fibrillose, not mealy, whitish, apex even. Veil none. Pileus submembranaceous, conical when young, then convex, at length expanded, obtuse, 1 in. and more across, bay or brownish-umber, disc even, margin striated and paler, the very thin flesh similarly coloured. Gills adnate, broad, distinct, rather distant, greyish-brown, then umber. (Fries.)

***Psathyra neglecta*. Massee.**

Pileus about  $\frac{1}{2}$  in. across, convex then almost plane, even, glabrous, pale ochraceous, when dry atomate, almost white except the disc; gills slightly attached, rather broad, ventricose, at maturity purple-brown, crowded; stem about 1 in. long, very slender, rather wavy, pellucid, glabrous, white, tinged with rufous below; spores elliptical, purple-brown, smooth,  $12 \times 6 \mu$ ; cystidia abundant, fusiform,  $50-60 \times 12-14 \mu$ .

On the ground; Kew Gardens, Nov. 1886. Readily distinguished by its small size and pale colour; agreeing with *Psathyra urticaecola* most nearly in size, but belonging to a different section.

III. FIBRILLOSI. *Pileus and stem at first fibrillose or floccose from the remains of the universal veil.*

*Psathyra frustulenta*. Fr.

Pileus about 1 in. across, membranaceous, fragile, campanulate then hemispherical, obtuse, hygrophanous, slightly striate, with white squamules near the margin; gills adnate, ascending, crowded, whitish, then watery cinnamon; stem about 2 in. long, and 1 line thick, equal, rather wavy, flocculose, white; spores elliptical, smooth, pale rusty-brown,  $10 \times 4 \mu$ .

*Agaricus (Psathyra) frustulentus*, Fries, Monogr. i. p. 422; Fries, Epicr., p. 209; Fries, Hym. Eur., p. 307.

Amongst gravel in damp places.

Departs from the *Erythrospora*e in the rusty-brown spores, but the general structure is that of *Psathyra*, much more than that of *Galera*.

Intermediate between the *Dermini* (= *Ochrospora*e) and the *Pratellae* (= *Porphyrospora*e). Allied to the former in the fusco-ferruginous spores, to the latter in general habit, remarkable fragility, and in being very hygrophanous. Stem fistulose, 2-3 in. long, 1 line thick, equal, subundulate, usually not straight, fibrillose or with scattered white downy portions, whitish. Pileus membranaceous, very fragile, campanulate, then hemispherical, obtuse, disc slightly fleshy, about an inch broad, slightly striatulate when moist, watery ferruginous but very pale; even and paler when dry, glabrous in both conditions, but at or near the margin whitish floccose. Gills adnate, crowded, ascending, watery cinnamon, then brownish. (Fries.)

*Psathyra bifrons*. Berk.

Pileus,  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, submembranaceous, campanulate, obtuse, ochraceous-brown, tinged with pink, pale ochraceous when dry, smooth, even, margin very thin, transparent; gills adnate, narrow, pinkish-grey, margin minutely toothed, white; stem 2-3 in. long, 1-2 lines thick, slightly attenuated upwards, straight, naked, whitish, hollow; spores elliptical,  $8 \times 4 \mu$ .

*Agaricus bifrons*, Berk., Engl. Flor., vol. v. p. 114; Cke., Hdbk., p. 215; Cke., Illustr., pl. 594.

*Agaricus (Psathyra) bifrons*, B., var. *semitinctus*, Phillips, Cke., Illustr., pl. 594 B.

On twigs, chips, &c.

Pileus  $\frac{3}{4}$  in. broad, furnished at first with a minute fibrillose very evanescent veil, rugulose, ochraceous-brown, more or less tinged with red; margin thin, transparent. Gills adnate, moderately broad, cinereous shaded with pink; margin white, composed of minute wavy teeth. Spores brown-purple. Stem  $2\frac{1}{2}$  in. high, 1 line thick, filiform, thickest at the base, beautifully but very minutely satiny, not pulverulent, very brittle. (Berk.)

*Psathyra semivestita*. B. & Br.

Pileus  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, thin, ovate-campanulate, obtuse, even, bay-brown when moist, becoming pallid-ochraceous when dry, sprinkled when young up to the middle with white fibrils; gills adnate or adnexed, rather broad, greyish then umber, narrowest in front; stem 2–3 in. long, 1 line thick, white silky, fibrillose, hollow; spores elliptical, 10–12  $\times$  5  $\mu$ .

*Agaricus (Psathyra) semivestitus*, Berk. & Broome, Ann. Nat. Hist., n. 920, t. 14, f. 5; Cke., Hdbk., p. 215; Cke., Illustr., pl. 578.

Amongst grass in rich pastures, woods, &c. Caespitose in the typical form, but a larger, solitary form occurs, having the pileus 1–1 $\frac{1}{2}$  in. across, stem 4–5 in. long, 2 lines or more thick, remarkable for the coating of white fibrils on the lower half of the pileus; these, however, usually disappear with age.

*Psathyra fatuus*. Fr.

Pileus  $\frac{3}{4}$ –1 in. across, submembranaceous, ovate-campanulate, then expanded, rugulose, fibrillose at first, then smooth and dingy ochraceous, apex darker, then paler; gills adnate, crowded, rather narrow, pale then brown; stem 2–4 in. long, about 1 $\frac{1}{2}$  line thick, fragile, almost smooth, white, apex rather mealy, hollow.

*Agaricus fatuus*, Fries, Syst. Myc. i. p. 296; Cke., Hdbk., p. 215; Cke., Illustr., pl. 595 A

On the ground.

Very fragile. Stem almost glabrous, pileus clay-coloured, then whitish. Veil none. (Fries.)

Stem hollow, 2-3 in. long, 2-3 lines thick, rather firm for the present genus, soon glabrous, white, base white and villose, apex striate and powdered with white meal. Pileus submembranaceous; at first ovate, then campanulate, at length expanded, obtuse, 2-3 in. broad, when young everywhere fibrillose and brownish clay-colour, when dry ochraceous clay-colour, when adult glabrous, rugulose, whitish clay-colour, margin slightly undulate, sometimes with fragments of the veil attached. Gills adnate,  $1\frac{1}{2}$ -2 lines broad, crowded, white, then brown, edge similarly coloured. Approaching to *Hypholoma appendiculatus*, but not growing on trunks. (Fries.)

***Psathyra fibrillosa*. Pers.**

Pileus  $1-1\frac{1}{2}$  in. across, submembranaceous, campanulato-convex, then expanded, and almost plane, minutely striate, at first fibrillose, livid then whitish; gills adnate, plane, broad behind, blackish-purple; stem about 2 in. long, 2 lines thick, equal, very fragile, fibrilloso-squamulose, white, often incurved at the base, hollow; spores blackish-purple.

*Agaricus fibrillosus*, Pers., p. 424; Cke., Hdbk., p. 216; Cke., Illustr., pl. 595 B.

On the ground or on rotten branches, in woods, &c.

Very variable in form and perhaps embracing two species, always solitary. Typical form very fragile. Stem hollow, 3-4 in. long, 2-3 lines thick, equal, everywhere covered with spreading fibrilloso-fasciculate squamules, white. Pileus submembranaceous, from campanulate to convex, then expanded, obtuse, livid or whitish, striate from the gills showing through the translucent pileus, commonly glabrous, sometimes at first squamulose, 1 in. and more across. Gills adnate, broadest behind, 3-5 lines broad, at length plane, grey, then blackish-purple. (Fries.)

***Psathyra Gordonii*. B. & Br.**

Densely tufted. Pileus  $1-1\frac{1}{2}$  in. across, membranaceous, campanulate, pale grey, then white, sprinkled with white floccose scales, margin sulcato-striate; gills ascending, narrowly adnate, distant, rather broad, scarcely ventricose, grey; stem about 2 in. high,  $1\frac{1}{2}$  line thick, transversely

undulate, pruinose above, floccose below, but becoming at length smooth and shining, fistulose; spores.

*Agaricus (Psathyra) Gordoni*, B. & Br., Ann. Nat. Hist., n. 922, pl. xv. fig. 7; Cke., Hdbk., p. 216; Cke., Illustr., t. 580 A.

On old stumps. Usually fasciculate, smell strong, disagreeable. When young the whole of the plant is covered with white floccose fibrils.

***Psathyra helobius*. Kalchbr.**

Pileus submembranaceous,  $1\frac{1}{2}$  in. across, conico-campanulate, then almost plane, with concentric elevated ridges, radiately rugose, subumbonate, sooty-brown, the striate margin brown, hygrophanous, pale with a reddish tinge when dry; gills adnate but slightly rounded behind, rather crowded, sooty-brown; stem 3-4 in. long, 2 lines thick, equal, rather flexuous, reddish-umber, covered with fugacious whitish squamules, paler and reddish when dry, hollow; spores elliptical, ends rather acute,  $12 \times 6 \mu$ .

*Agaricus (Psathyra) helobius*, Kalchbrenner, Icon. Hym. Hung., p. 31, tab. 17, fig. 4; Cke., Hdbk., p. 216; Cke., Illustr., pl. 579.

Damp places in woods.

Spores quite black when seen in the mass on a white ground, hence the species is technically a *Psathyrella*, but the whole habit and the stem clad with white fibrillae point to *Psathyra*, and more especially to *Psathyra fibrillosa*. (Kalchbr.)

***Psathyra pennata*. Fr.**

Pileus about 1 in. across, submembranaceous, campanulate, obtuse, even, pale ochraceous, disc brownish, covered with white plumose squamules, then naked; gills adnexed, 2-3 lines broad, crowded, livid then blackish-brown; stem about 2 in. long, 2-3 lines thick, silvery white, villose, rather mealy at the apex, hollow.

*Agaricus (Psathyra) pennatus*, Fries, Syst. Myc. i. p. 297; Cke., Hdbk., p. 216; Cke., Illustr., pl. 580 B.

On naked soil.

Somewhat resembling *Coprinus cinereus*, livid white, stem usually short, but sometimes elongated. Margin of pileus sometimes appendiculate.

Stem fistulose, 1-1½ in. long, 1-2 lines thick, equal, villous, apex rather powdery, silvery. Pileus submembranaceous, ovate then campanulate, ½ in. high and broad, 1 in. broad when expanded, not striate, but densely covered for a long time with white feathery scales, at length naked, changing from livid to white, or in the young stage brownish-bay. Gills adnexed, crowded, ventricose, broad, livid then blackish-brown. (Fries.)

*Psathyra gossypina*. Bull.

Pileus ¾-1 in. across, submembranaceous, campanulate, obtuse, becoming expanded, dingy pale ochraceous, tomentose then smooth, margin striate; gills adnexed, ventricose, rather broad, white then brownish-black; stem about 2 in. long, 1½ line thick, whitish, tomentose, hollow, sometimes rather wavy; spores elliptical, 10 × 6 μ.

*Agaricus (Psathyra) gossypinus*, Bulliard, t. 425; fig. 2; Cke., Hdbk., p. 216; Cke., Illustr., pl. 612 A; Bolton, t. 71, fig. 1.

On the ground and on fragments of twigs in woods.

Often subcaespitose, fragile, distinguished from *Psathyra pennata* by the striate margin of the pileus.

From the habit was once considered as a *Coprinus*, but evidently a *Psathyra*, allied to *P. pennata*, from which it differs more especially in the loose floccose covering of the pileus (veil) being more tomentose, and which densely clothes the young fungus, the colour also differs in being ochraceous clay-colour. When adult the pileus is glabrous and pale. Gills livid, then fuscous. The rest as in *P. pennatus*. (Fries.)

*Psathyra noli-tangere*. Fr.

Pileus ½-¾ in. across, membranaceous, campanulate then expanded, everywhere striate, hygrophanous, squamulose about the margin, pale umber, becoming pale when dry; gills adnate, broad, pale brown; stem about 1½ in. long, 1 line or more thick, very fragile, nearly naked, apex even; spores elliptical, 12 × 5 μ.

*Agaricus (Psathyra) noli-tangere*, Fries, Epicr., p. 234; Cke., Hdbk., p. 217; Cke., Illustr., pl. 612 B; Sowerby, pl. 167. Amongst chips.

Altogether very fragile, every part pale umber when

moist, pileus paler when dry, even and spuriously squamuloso-appendiculate. (Fries.)

In Cooke's figure quoted above, the pileus is represented with a distinct umbo.

A large form grows on oak chips, a small form on damp ground in shady places. Very fragile. Stem fistulose, about 1 in. long, 1 line thick, equal, almost naked, apex even. Pileus membranaceous, campanulate, then expanded, obtuse, 1 in. or less, glabrous except for the presence of deciduous squamules, everywhere striate, the large form pale umber when moist, small form obscure brown. Very hygrophanous, becoming pale when dry. Gills adnate, broad, plane, sometimes pallid, at others obscure brown. (Fries.)

***Psathyra microrhiza*. Lasch.**

Pileus about 1 in. across, membranaceous, campanulate, even, dry, shining with atoms, at first with yellow hair-like fibrils; gills adnexed, crowded, narrow, at first pale, then blackish-brown; stem 2 in. long, about 1 line thick, attenuated into a tapering root-like base, silky, whitish, hollow.

*Agaricus (Psathyra) microrhiza*, Lasch., n. 468, Fries, Hym. Eur., p. 309; Cke., Hdbk., p. 217; Cke., Illustr., pl. 596 A.

In grassy places.

Gregarious, at first everywhere flocculose, fragile, small. Pileus ochraceous or rufous-brown, becoming pale. (Fries.)

Distinguished by the tapering, rooting base of the stem.

Gregarious, varying in size from a few lines to  $1\frac{1}{4}$  in. when it approaches the finer forms of the *P. gossypina*. (Berk.)

***Psathyra urticaecola*. B. & Br. (fig. 15, p. 351.)**

Pileus 2-3 lines across, campanulate, flocculent, margin straight at length, striate, white; gills broadest in front, adnexed, white, then chocolate; stem  $\frac{1}{2}$ -1 in. high, slender attenuated upwards, fistulose, flocculent, white; spores  $7 \times 4 \mu$ .

*Agaricus (Psathyra) urticaecola*, B. & Br., Ann. Nat. Hist., n. 919; Cke., Hdbk., p. 217; Cke., Illustr., t. 596 B.

On nettle stems. Distinguished by its small size and white colour.

PSILOCYBE. Fries. (figs. 11, 12, p. 351.)

Pileus more or less fleshy, smooth, margin at first incurved; gills and spores at length brownish or purplish; stem central, rather cartilaginous, rigid or tough, tubular, tube either hollow or stuffed, often rooting. Veil absent or rudimentary, never interwoven to form a membrane.

*Psilocybe* (as a subgenus of *Agaricus*), Fries, Syst. Myc. i. p. 289; Cke., Hdbk., p. 207.

Distinguished from *Psathyra* by the margin of the pileus being at first incurved, and from *Agaricus* and *Stropharia*, which some of the species resemble, by the absence of a ring.

*Psilocybe* is analogous to *Naucoria*, *Leptonia* and *Collybia*.

Pileus glabrous, veil either absent (or in a few species that grow on dung, very fugacious). Distinguished from *Psathyra* by the margin of the pileus being incurved at first. Stem almost cartilaginous, and in this respect corresponding with *Collybia* and *Naucoria* rather than *Clitocybe*. In the present genus there are two primary divisions characterised by being *tough* or *fragile*. These are connected by species having the pileus innately fibrillose. Almost all the species are terrestrial, gregarious, often caespitose, inodorous, not edible. (Fries.)

#### ANALYSIS OF THE SPECIES.

I. TENACES.—Veil accidental, rarely conspicuous. Pileus with a pellicle, often rather viscid in damp weather, becoming pale. Colour of pileus clear, bright. Stem firm, flexile, often coloured.

\* Gills ventricose, not decurrent.

\*\* Gills plane, very broad behind, subdecurrent. (= Subgen. *Decornica* of W. G. Smith.)

\*\*\* Gills almost linear, ascending.

II. RIGIDI.—Veil absent. Pileus scarcely pelliculose, but the flesh frequently splitting, hygrophaneous. Gills adnexed, very rarely adnate. Stem rigid.



The total absence of the partial veil from the first separates the species included in the present section from those of *Agaricus* and *Hypholoma*, which they otherwise much resemble.

I. TENACES. *Veil accidental, rarely conspicuous, Pileus pelliculose, often rather viscid when moist, becoming pale. Colour of pileus bright. Stem hard, flexible, often coloured.*

\* *Gills ventricose, not decurrent.*

***Psilocybe sarcocephala*. Fr.**

Pileus 2-4 in. across, fleshy, compact, convex, obtuse, becoming expanded and sometimes depressed in the centre, even, dry, pale tawny becoming pale, the margin sometimes whitish; gills adnate, very broad, (3-4 lines), not crowded, greyish flesh-colour, then sooty from the dark spores; stem 3-5 in. long, 2-4 lines thick, subequal, usually curved or flexuous, whitish, apex powdered with white meal, stuffed then hollow; spores elliptical, dull brown,  $7 \times 3.5 \mu$ .

*Agaricus (Psilocybe) sarcocephalus*, Fries, Monogr. 1, p. 429, (not of Epicr.); Hym. Eur., p. 297; Cke., Hdbk., p. 208; Cke., Illustr., pl. 567 and 520.

Grassy places, especially about stumps. Solitary or clustered. Distinct from every other species in the fleshy, compact pileus.

In every respect the noblest and most distinct species belonging to the present genus, not related to any other species. Gregarious, subcaespitose; without the slightest trace of a veil. Stem robust, stuffed then hollow, elongated, curved, equal or slightly thinner below, whitish, sometimes with a rusty tinge, powdered with white meal at the apex, slightly squamulose, in other respects glabrous. In clustered individuals the stem is wavy and thinner, 3 in. long, 2-3 lines thick; in the larger form, not caespitose, the stem is stouter, straight, 3-4 in. long, up to 1 in. thick. Pileus truly fleshy, rather firm, convex then expanded, obtuse, 3-4 in. broad, the smallest 1-2 in., even, glabrous, dry, pale ferruginous. Flesh white, unchangeable, firm, not tough. Gills adnate, in the large form  $\frac{1}{2}$  in. broad, ventricose, rather thick, not crowded, greyish flesh-colour, then rather fuliginous from the spores. (Fries.)

**Psilocybe ericaea.** Pers.

Pileus  $\frac{3}{4}$ – $1\frac{1}{2}$  in. across, conico-convex, then expanded and becoming almost plane or sometimes more or less depressed, rather viscid when moist, even, glabrous, tawny-ferruginous or bay, pale yellowish and shining when dry; gills adnate, 3–4 lines broad, plane, pallid then black; stem 3–4 in. long, 2 lines thick or more, subequal, flexuous, rarely straight, tough, pallid, partly hollow; spores elliptical, brown,  $9$ – $10 \times 5 \mu$ .

*Agaricus ericaeus*, Pers., Syn., p. 413; Fries, Hym. Eur., p. 298; Cke., Hdbk., p. 208; Cke., Illustr., pl. 568.

In wet, exposed pastures. Usually gregarious.

Gregarious, tough, size variable. Stem hollow, tough, 3–4 in. long, 2 lines thick, equal, almost glabrous, sometimes slightly silky, yellowish, base with white down. Pileus fleshy, thin, convex then expanded, scarcely umbonate,  $1$ – $1\frac{1}{2}$  in. and more broad, even, glabrous, commonly dry and shining, but rather viscid when moist, tawny-ferruginous, when dry tawny-yellow. Gills adnate, 3–4 lines broad, plane, rather distant, pallid then blackish, pruinose, edge whitish. There is a small form found in muddy places with a bay pileus. (Fries.)

**Psilocybe subericaea.** Fr.

Pileus 1–2 in. or more across, rather fleshy, convex, obtuse, becoming plane, even, smooth, tawny then pale; gills sinuate, adnexed, 2–3 lines broad, pallid then blackish; stem 1–2 in. long, about  $1\frac{1}{2}$  line thick, equal, smooth, yellowish, distinctly hollow; spores elliptical,  $10 \times 6 \mu$ .

*Agaricus (Psilocybe) subericaeus*, Fries, Icon., n. 367, t. 136, fig. 2; Cke., Hdbk., p. 208; Cke., Illustr., pl. 588.

In fields.

**Psilocybe udus.** Pers. (figs. 11, 12, p. 351.)

Pileus  $\frac{3}{4}$ –1 in. across, slightly fleshy, convex then plane, dry, rugulose, tawny-bay then pale yellowish; gills adfixed, ventricose, lax, whitish then purplish; stem 3–5 in. long,  $1$ – $1\frac{1}{2}$  line thick, tough, straight or a little wavy, fibrillose, pale above, ferruginous below, hollow; spores elliptical brownish-purple,  $10 \times 5 \mu$ .

*Agaricus udus*, Pers., Syn., p. 414; Fries, Hym. Eur., p. 298; Cke., Hdbk., p. 208; Cke., Illustr., pl. 569.

In swamps, amongst sphagnum, &c.

Pileus testaceo-tawny, becoming pale, not hygrophanous. There is a variety with the pileus almost membranaceous, acutely conical, tawny, gills yellowish-white, owing to being almost sterile. Amongst sphagnum. (Fries.)

Scattered, tough when young, slender. Stem fistulose, 2-3 in. long, 1 line or more thick, equal, fibrillose, tawny-ferruginous, paler at the apex; pileus rather fleshy, convex then expanded, more or less evidently umbonate,  $\frac{1}{2}$ -1 in. broad, glabrous, even, rugulose when old, tawny-bay. Gills adfixed, ventricose, very broad, lax, plane or convex, pallid then purplish-brown.

Amongst high mosses, especially Polytricha, there is a form with a longer, more or less tawny stem, pileus smaller, becoming depressed, yellow then whitish, often striate; gills livid-yellow or clouded with white.

Amongst sphagnum it becomes very much drawn out, very slender, stem slender, wavy, pallid; pileus submembranaceous, at first conical, livid yellow and striate when moist (tinged greenish), even and yellow when dry; gills pallid, not becoming discoloured, and commonly sterile. (Fries.)

***Psilocybe canofaciens*. Cke.**

Gregarious. Pileus  $\frac{3}{4}$ -1 in. across, campanulate then expanded, scarcely umbonate, but with a fleshy disc, even, dark bay-brown, ferruginous at the apex, clad everywhere, as well as the stem, with delicate, white, scattered hairs, which are soon evanescent at the apex; veil white, fibrillose, at first attached to the margin of the pileus; stem 2-3 in. high, 2-3 lines thick at the apex, subequal or slightly attenuated downwards, of the same colour as the pileus, very dark at the base, stuffed; flesh of pileus pallid, of the stem rufescent, gradually darker downwards; gills 3 lines broad, adnate, ventricose, dark umber; spores umber-brown, elliptic-oblong, very variable in size, the longest  $17 \times 8$ , the smaller  $10 \times 4 \mu$ .

*Agaricus (Psilocybe) canofaciens*, Cke., Grev. 14, p. 1; Cke., Hdbk., p. 208; Cke., Illustr., pl. 621.

*Agaricus areolatus*, W. G. Smith, in Brit. Mus.

On rotten straw.

A very distinct species, known by the dark colour of the pileus and stem, both of which are sprinkled with white fibrils.

***Psilocybe areolata.* Klotzsch.**

Pileus 1-3 in. across, convex, obtuse, then expanded, dry, minutely fibrillose, cuticle breaking up into angular patches, ochraceous or rufous, interstices and margin pale, yellowish; gills adnexed, 2-3 lines or more broad, umber then blackish with a purple tinge, margin whitish; stem 2-3 in. long, 2-3 lines thick, equal, attenuated or slightly thickened below, fibrillose, dingy white, hollow; flesh of pileus and stem tinged brown; veil fugacious; spores blackish umber with a purple tinge,  $12-13 \times 8 \mu$ .

*Agaricus areolatus*, Klotzsch, in Berk., Eng. Flor., vol. v.; Cke., Hdbk., p. 209; Cke., Illustr., pl. 590.

In gardens, &c.

Pileus  $\frac{1}{2}$ -3 in. broad, convex, ochre or fuscous; veil between fibrous and membranaceous, fugacious; gills 2-3 lines broad, the edge white and beaded with drops of moisture. Stem 2-3 in. high, generally thickened at the base, fibrillose, dirty white. (Klotzsch.)

Densely caespitose. Pileus at first white, with the cuticle entire, at length rufous and cracking into areolae, a much firmer plant than *A. spadiceus*, not brittle. Stem striate, pulverulent, especially towards the apex, hollow; gills with a distinct white edge, at first very pale, spores very dark, almost black, broadly almond-shape. (W. G. Smith.)

***Psilocybe virescens.* Massee.**

Pileus  $1-1\frac{1}{2}$  in. across, convex, obtuse, then becoming expanded, when young minutely silky, bright dark brown, during expansion the brown cuticle becomes broken up into persistent angular patches, the interstices being clear pale green, becoming yellowish with age; gills adnexed, rather crowded, 3 lines broad, soft, pallid then smoky purple, margin pale; stem about 2 in. long, 3 lines thick, equal, smooth, apical portion pale green and strongly striate, lower portion ferruginous, extreme base snow-white, downy, firm, hollow, straight or slightly incurved; spores sooty purple, elliptical, ends obtuse,  $9 \times 5 \mu$ .

On rotten chips and stumps.

*Agaricus (Psilocybe) areolatus*, Klotzsch, var. *virescens*, Cooke and Massee, in Cooke's Hdbk., p. 376; Cke., Illustr., pl. 1177.

Solitary. Taste and smell none.

Quite distinct from *P. areolata* in being solitary and not fasciculate, in growing on wood, and in the purple gills and different spores.

***Psilocybe agraria*. Fr.**

Pileus about  $\frac{3}{4}$  in. across, conico-convex, then expanded, whitish then becoming grey, not hygrophanous, subumbonate, subsulcato-striate; flesh white; stem  $2\frac{1}{2}$  in. long, thin, flexuous, hollow, white; gills very distant, rather broad, shortly adnato-adnexed, grey.

*Agaricus (Psilocybe) agraria*, Fries' MSS.; Berk. and Br. in Ann. Nat. Hist., n. 1257; Cke., Illustr., t. 622.

About the roots of decayed trees. Allied to *A. coprophilus*. In colour the pileus somewhat resembles *Hygrophorus ovinus*. (B. and Br.)

***Psilocybe chondroderma*. B. & Br.**

Pileus about 1 in. across, campanulate, fleshy, dark bright brown, very smooth, cracked here and there, margin thin, appendiculate; gills ventricose, adfixed, seceding, dark brown, edge white; stem subequal,  $2\frac{1}{2}$ –3 lines thick, fistulose, paler than the pileus, fibrillose, base squamulose; spores purple-black, elliptical,  $7 \times 3\text{--}5 \mu$ .

*Agaricus (Psilocybe) chondroderma*, B. & Br., Ann. Nat. Hist., n. 1538; Cke., Hdbk., p. 209.

In pine woods. Veil jagged. The pileus stains paper yellow.

***Psilocybe scobicola*. B. & Br.**

Pileus  $1\text{--}1\frac{1}{2}$  in. across, convex, umbilicate, glabrous, white; gills broad, adnexed, brown with red tinge; stem  $1\text{--}1\frac{1}{2}$  in. long, 2 lines thick, fibrillose, whitish, subequal or dilated at the apex, hollow; spores elliptical.

*Agaricus (Psilocybe) scobicola*, B. & Br., Cke., Hdbk., p. 210; Cke., Illustr., t. 607.

On branches, sawdust, &c. Distinguished amongst the white species of *Psilocybe* by the umbilicate pileus.

**\*\* Gills plane, very broad behind, subdecurrent.**

***Psilocybe ammophila*. Mont.**

Pileus  $\frac{3}{4}$ –1 in. across, rather fleshy, hemispherical then expanded and umbonate, yellowish-brown; gills with a subdecurrent tooth, plane, rather narrow, smoke-colour, powdered with the dark spores; stem about 2 in. long,  $1\frac{1}{2}$  line thick, the lower half clavate, sunk in the sand, and covered with matted mycelium, upper portion white, hollow; spores elliptic-fusiform,  $12 \times 8 \mu$ .

*Agaricus ammophilus*, Montagne, in Expl. Scient. Alg., t. 31; Cke., Hdbk., p. 210; Cke., Illustr., pl. 606 B.

Amongst sand.

Remarkable for the clavate basal half of the stem being densely matted with mycelium, and sunk in the sand in which the fungus grows.

***Psilocybe coprophila*. Bull.**

Pileus about  $\frac{3}{4}$  in. across, rather fleshy, hemispherical then expanded, umbonate, even, yellowish rufous; gills arcuate, rather decurrent, 2 lines and more broad, livid-brown; stem 1–2 in. long, at first short and floccose, then elongated, glabrous, and shining, attenuated upwards, apex pruinose, hollow.

*Agaricus (Psilocybe) coprophilus*, Bulliard, Champ., t. 566, f. 3; Cke., Hdbk., p. 210; Cke., Illustr., pl. 608 A.

On dung and in pastures.

Superficially resembling *Psilocybe bullacea*, but distinguished by the absence of striae on the pileus, and by the stem being at first short and flocculose, then elongated and glabrous.

Stem more or less hollow, at first with a central pith, short (1 in.), hairy flocculose, then elongated and almost smooth, shining, 1 line thick, attenuated upwards, and there mealy. Veil scarcely evident. Pileus rather fleshy, hemispherical, then expanded, umbonate, 1 in. broad, even, glabrous, scarcely viscid, yellowish-rufous. Gills arcuate-decurrent, broad, crowded, livid then brown. (Fries.)

Pileus when very young white and downy; subhemispherical, clothed with little white superficial scales, at length smooth and pale amber, darker at the obtuse apex,

slightly fleshy. Stem flexuous, slightly attenuated upwards, whitish, shining, at first scaly like the pileus, within which it is pruinose; gills nearly plane, ventricose, adnato-arcuate, subdecurrent, umber-brown. (Berk.)

***Psilocybe bullacea*. Bull.**

Pileus  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, rather fleshy, hemispherical then expanded, at length umbonate, glabrous, finely striate to the middle, tawny-bay, clay-colour when dry; gills adnate, broad, triangular, plane, crowded, rusty-brown; stem 1–1 $\frac{1}{2}$  in. long, 1 line or more thick, equal, fibrillose, pale-yellowish, base brownish, hollow.

*Agaricus (Psilocybe) bullaceus*, Bulliard, Champ., t. 566, f. 2; Cke., Hdbk., p. 210; Cke., Illustr., pl. 608 B.

On dung, rich soil, &c.

Veil at first often evident, sometimes appendiculate from the margin. Stem 1 in. long or a little more, 1 line thick, yellowish, base rusty-brown. Pileus scarcely reaching an inch across, tawny-bay, clay-colour when dry, when moist a viscid pellicle readily separates from the pileus. Gills of themselves livid-white, spores on a black ground purple-lilac. (Fries.)

Gregarious. Stem hollow, 1 in. or a little more in length, 1 line thick, equal or attenuated at the base, cortinated when young, then rather fibrillose, tawny then yellowish, base rusty-brown. Pileus rather fleshy at the disc, margin almost membranaceous, hemispherical, obtuse, then expanded, umbonate, 4–6 lines broad, covered with a separable viscid pellicle, glabrous, tawny-bay, then reddish-ochre, clay-colour when dry; margin at first even, with fragments of the appendiculate veil, then naked and striate. Gills adnate, minutely decurrent, subtriangular, plane, crowded, livid-white then rusty-brown. Spores purple-lilac on a black ground. (Fries.)

***Psilocybe physaloides*. Bull.**

Pileus  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, slightly fleshy, campanulate then expanded, sometimes subumbonate and depressed round the umbo, even, rather viscid, purple-brown, becoming paler; gills slightly decurrent, crowded, rather broad, rusty-brown; stem about 1 in. long, and 1 line thick, equal, rather pliant,

minutely fibrillose, pale, base rusty, hollow; spores elliptical, brown,  $12 \times 6 \mu$ .

*Agaricus (Psilocybe) physaloides*, Bulliard, Champig., t. 366, fig. 1; Cke., Hdbk., p. 210; Cke., Illustr., pl. 609 A.

On the ground in fertile places, also amongst moss. Cooke says, on dung.

Closely related to *Psilocybe bullacea*; on white paper the spores are blackish-purple, on black paper lilac-violet. Pileus purple-brown, paler towards the margin, at length umbonate and depressed round the umbo. Readily confounded with *Tubaria inquilina*. (Fries.)

Stem fistulose, filiform, wavy, 1 in. and more long, adpressedly fibrillose, pale, base bay. Veil not evident. Pileus rather fleshy, campanulate then expanded, at length flattened, umbo prominent, usually depressed round the umbo, 3-4 lines broad, glabrous, even, with a viscid pellicle, shining, purple-brown. Gills adnate, slightly decurrent, crowded, pale rusty-brown. Spores purple-brown, almost black when on white paper, on a black-ground lilac-violet. (Fries.)

#### *Psilocybe nuciseda*. Fr.

Pileus  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, rather fleshy, convex, obsoletely umbonate, expanded and sometimes depressed round the umbo, pale-brown, when dry yellowish and minutely silky; gills adnate, broad, plane, brown then blackish-umber; stem about 1 in. long,  $1\frac{1}{2}$  line thick, becoming thinner downwards, brownish, with white down, hollow; spores brown, elliptical,  $8 \times 4 \mu$ .

*Agaricus (Psilocybe) nucisedus*, Fries, Syst. Myc. i. p. 293; Cke., Hdbk., p. 210; Cke., Illustr., pl. 609 B.

On involucre of beech, and fragments of various kinds of wood.

Stem slender, 1-2 in. long, apex as in *Psilocybe atro-rufus*, often pruinose. Pileus yellowish. With exactly the habit of *Tubaria inquilina*, but differing in the spores. A similar form occurs on hazel nuts, but every part umber, and yellowish clay-colour when dry. (Fries.)

On involucre and rotten wood of beech. Differs from *P. atro-rufa* in growing on wood, in the paler, tougher stem, which is attenuated downwards, and white and downy at



the base; pileus rather umbonate, rather silky and yellow when dry, gills scarcely decurrent. (Fries.)

***Psilocybe atro-rufa*. Schaeff.**

Pileus  $\frac{1}{2}$ –1 in. across, rather fleshy, hemispherico-convex, obtuse, then expanded, glabrous, margin slightly striate, dark rufous or purple-brown, pale when dry, even; gills subdecurrent, 2 lines broad, plane, becoming umber; stem 2–3 in. long,  $1\frac{1}{2}$  line thick, equal, straight, or wavy, pale bay then whitish, hollow; spores elliptical, purple-brown,  $10\text{--}12 \times 6 \mu$ .

*Agaricus (Psilocybe) atro-rufus*, Schaeff., t. 234; Cke., Hdbk., p. 211; Cke., Illustr., pl. 571.

On the ground in woods, &c.

Fries says that there are two forms: (a) Stem fibrillose; on the ground in woods. (b) Stem short, glabrous; in sunny places amongst gravel.

Stem fistulose, thin, scarcely 1 line thick, equal, at first subfibrillose, then glabrous, pale bay, apex rather mealy; pileus slightly fleshy, obtuse, hemispherico-convex, glabrous, in full vigour of growth the margin is striate, dark rufous or purple-brown, when dry becoming very pale and without striae. Gills adnate, subdecurrent, triangular, plane, umber or purple-umber. (Fries.)

\*\*\* *Gills almost linear, ascending.*

***Psilocybe compta*. B. & Br.**

Pileus  $1\text{--}1\frac{1}{2}$  in. across, conico-campanulate, then becoming expanded, pale ochraceous and atomate when dry, scarcely rugulose, striate, margin at first inflexed, crenulate; gills distant, ventricose, broad, adnate, umber with a rosy tinge; stem 2 in. high,  $1\text{--}1\frac{1}{2}$  lines thick, flexuose, glabrous, silky and shining, not striate above, below very pale rufous, fistulose; spores purple-brown.

*Agaricus (Psilocybe) comptulus*, B. & Br., Ann. Nat. Hist., n. 917, t. xiv. f. 3; Cke., Hdbk., p. 211; Cke., Illustr., t. 589 A.

In woods amongst grass. Our only pale *Psilocybe* with a distinctly striate margin and subumbonate pileus.

**Psilocybe semilanceata. Fr.**

Pileus  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, submembranaceous, acutely conical, sometimes almost cuspidate, margin more or less persistently incurved, slightly viscid and striatulate when moist, when dry very pale yellow or pallid with tinges of yellow, or blue-green, shining; gills subdistant, broadly adnate, brown then blackish with purple tinge, margin pale; stem 2–3 in. long,  $1\frac{1}{2}$  line thick, equal, tough, wavy, silky-fibrous and shining, pallid, with minute, evanescent fibrils at the apex, stuffed with silky fibres; spores brown,  $10\text{--}12 \times 6 \mu$ .

*Agaricus (Psilocybe) semilanceatus*, Fr., Obs., ii. p. 178; Cke., Illust., t. 572; Cke., Hdbk., p. 211.

Amongst grass in pastures, &c. Gregarious, pileus sometimes quite obtuse, from which condition every transition exists to cuspidate.

Fries says that he has observed the presence of a sub-annulate ring in the young stage of the present species and consequently it might with equal propriety be placed in the genus *Stropharia*, after *S. semiglobata*.

**Var. caerulescens. Cooke.**

Pileus rather obtuse, bare of stem, more or less distinctly tinged with blue; spores,  $10\text{--}12 \times 6 \mu$ .

Cke., Illust., t. 573.

Amongst grass in pastures.

It is doubtful as to the propriety of considering the above a true variety; I do not consider it as even a permanent form; in the type the relative prominence of the umbo is very variable, and there is frequently a tinge of blue at the base of the stem, and Cooke's variety, if retained, rests entirely on the distinct blue tinge at the base of the stem.

**II. RIGIDI.** Veil absent. Pileus scarcely pelliculose, flesh frequently splitting, hygrophanous. Gills adnexed, rarely adnate. Stem rigid.

**Psilocybe canobrunnea. Fr.**

Pileus 2–3 in. broad, fleshy, convex then plane, obtuse, hygrophanous, rather viscid when moist, fleshy-brown, pale when dry; stem about 2 in. long,  $\frac{1}{4}$  in. or more thick, whitish, squamulose, rooting, hollow; gills almost free, crowded, broad, ventricose, pallid then brownish-purple.

*Agaricus (Psilocybe) canobrunneus*, Gries, Syst. Myc. i. p. 294; Fries, Hym. Eur., p. 302.

On the naked ground in sunny places, and on scorched ground.

Solitary. Firm, rigid, pileus flesh-colour, when dry pale clay-colour.

Solitary or laxly gregarious, amongst the most robust and firm in this genus. Stem rigid, hollow, 2 in. and more long, 3-5 lines thick, equal, base rooting, squamulose, whitish. Veil not seen even in the earliest stage of development. Pileus truly fleshy, convexo-plane, obtuse, 2-3 in. broad, even, glabrous, from its rigidity sometimes cracked in an areolate manner, rather viscid when moist, watery pallid or brownish flesh-colour, pale clay-colour when dry. Flesh thickish, white. Gills almost free, ventricose, 3 lines broad, rather crowded, distinct, pallid then purple-brown. (Fries.)

***Psilocybe spadicea*. Fr.**

Fasciculate, pileus rigid, 1-3 in. across, convex, obtuse then more or less plane, glabrous, even, moist, hygrophanous, bay-brown when moist, pallid when dry; gills rounded behind and adnexed, dry, crowded, about 2 lines broad, pale then rosy-brown; stem 2-4 in. long, rather tough, 2-3 lines thick, equal, whitish, smooth, apex even, hollow; spores elliptical, brown,  $9 \times 4 \mu$ .

*Agaricus (Psilocybe) spadiceus*, Fries, Epicr., p. 225; Cke., Hdbk., p. 211; Cke., Illustr., pl. 610.

On the ground amongst leaves, at the base of trunks, &c.

Rather caespitose. Veil entirely absent from the first. Stem firm, cartilaginous (in moist places on the ground, softer). Pileus convexo-plane, even, at first glabrous, rigid, rough with minute points, bay-umber, becoming pale when dry, flesh whitish, margin slightly incurved, when dry often broken up, especially var. *polycephalus*. Gills at length either cinnamon (in dry weather), or umber. (Fries.)

**Var. *hygrophilus*.** Large, pileus brown then clay-colour; stem 4-6 in. long, rather fusiform and rooting, gills emarginate with a long decurrent line down the stem, at length umber-brown.

Fries, Syst. Myc. i. p. 296; Cke., Hdbk., p. 212.

At roots of ash in damp places.

*Var. polycephalus*, densely crowded, more rigid, stems thinner, flexuose; gills almost free, at length umber-brown.

Paulet, t. iii. figs. 1-2; Fries, *Hym. Eur.*, p. 302; Cke., *Hdbk.*, p. 212.

On trunks.

Colour as in the typical form, bay then ochraceous, or pallid-livid then clay-colour.

At the base of trunks, amongst leaves, &c., very common. Very distinct from *Hypholoma appendiculatum*, which it approaches in colour, in the more rigid pileus and stem, and in the complete absence of a veil. Known from every other species of the present genus in the gills being white then flesh-colour, and finally brown. In size and other points very variable. Typically large, terrestrial, forming large, loose clusters. Stem firm, subcartilaginous, hollow, 3-4 in. long, 3-5 lines thick, equal, often curved, glabrous, white, apex not striate. Pileus fleshy, convex then plane, obtuse, 3-4 in. broad, even, glabrous, moist in wet weather but not viscid, umber-brown, becoming pale when dry, often cracked and torn, margin inflexed when young. Gills rounded-adnexed, crowded, dry, white, then flesh-colour, at length umber. (Fries.)

***Psilocybe squalens*. Fr.**

Pileus 1-2 in. across, rather fleshy, convex then plane or depressed, even, glabrous, moist, hygrophalous, lurid then pale; gills adnato-decurrent, crowded, plane, clay-colour then brown; stem about 2 in. long and 2 lines thick, equal, not rooting, apex striate, nearly like the pileus in colour, stuffed.

*Agaricus (Psilocybe) squalens*, Fries, *Epicr.*, p. 226; Fries, *Hym. Eur.*, p. 303.

On and near trunks.

Solitary or tufted. Veil absent. Stem 1-2 in. long, 1-2 lines thick, tough, obsoletely fibrillose. Pileus 1-2 in. across, lurid then pale, margin incurved. Spores rusty-brown.

Resembling *Psilocybe cernuus*, but quite distinct in the brownish-ferruginous spores, hence technically belonging to the *Ochrospora*e; veil none. Stem stuffed then hollow, not very rigid, not rooting, about 2 in. long, 2 lines thick, equal,

obsoletely fibrillose, apex rather mealy, almost the same colour as the pileus. Pileus rather fleshy, convex then plane, obtuse, 1-2 in. broad, even, glabrous, when moist (not viscid) ferruginous with a lurid aspect, becoming pale dingy clay-colour when dry. Flesh whitish. Gills adnexed with a decurrent tooth, ventricose, 2 lines broad, crowded, from dingy clay-colour becoming cinnamon-umber. (Fries.)

***Psilocybe cernua*. Fl. Dan.**

Pileus  $\frac{3}{4}$ -1 in. across, rather fleshy, campanulato-convex, then more or less expanded, glabrous, hygrophanous, rugulose when dry, pallid; stem 2-4 in. long, 2 lines thick, about equal, flexuose, whitish, glabrous, rather mealy at the apex; gills adnate, slightly ventricose, not very close,  $\frac{1}{2}$  line broad, greyish-white, then dark-brown.

*Agaricus cernuus*, Müll. in Flor. Danica, t. 1005; Cke., Hdbk., p. 212; Cke., Illustr., pl. 574; Fries, Hym. Eur., p. 302.

On the ground, on leaves, rotten wood, &c.

Commonly caespitose. Intermediate between *Psathyra* and *Psilocybe*, rather fragile. Pileus becoming pallid, pellucidly striatulate, naked from the first, veil absent.

Differs from all forms of *Psilocybe spadicea* in the gills never assuming a flesh-coloured tinge. Stem hollow, 2 in. and more long, about 2 lines thick, equal, terete, rigid, fragile, glabrous, white, apex rather mealy, sometimes curved, when the pileus becomes cernuus. Veil none! Pileus rather fleshy, fragile, campanulate then expanded, obtuse, 1-2 $\frac{1}{2}$  in. broad, glabrous (or atomate under a lens), pale livid when moist, when dry white and rugulose. Gills adnate, at first linear, then ventricose, scarcely crowded, 1-2 lines broad, at first white then greyish-black. Spores with no trace of a ferruginous tinge. (Fries.)

***Psilocybe hebes*. Pers.**

Pileus  $\frac{1}{2}$ -1 in. across, rather fleshy, convex and obtuse, then expanded, smooth, margin finely striate, hygrophanous, lurid, pale when dry; gills adnate but cut out behind so as to be almost triangular, crowded, pale then brown; stem about 1 in. long, equal, 1 $\frac{1}{2}$  line thick, glabrous, whitish, hollow, often slightly incurved at the base; spores elliptical, 14-16  $\times$  7  $\mu$ .

*Agaricus (Psilocybe) hebes*, Persoon, Myc. Eur. 3, t. 28, f. 5; Fries, Syst. Myc. i. p. 293; Cke., Hdbk., p. 212; Cke., Illustr., pl. 589 B.

On trunks, leaves, &c.

Pileus lurid, i.e., a dingy obscure olive, pale and even when dry, rather viscid when moist. Pileus rather rigid, as are also the gills.

Commonly solitary; rigid and firmer than *Psilocybe murcidus*. Stem cartilaginous, rigid, hollow,  $1\frac{1}{2}$ –2 in. long, 2 lines thick, equal, even, glabrous, naked, whitish. Veil absent! Pileus rather fleshy, convex then expanded, obtuse, 1 in. broad, even, glabrous, hygrophanous, rather viscid, lurid, and with the margin slightly striate when moist; pale and even when dry. Gills very broad behind, triangular, entirely adnate, crowded, dry, white then brownish. Readily known by the form of the gills. (Fries.)

***Psilocybe foenisecii*. Pers.**

Pileus  $\frac{1}{2}$ –1 in. across, campanulato-hemispherical then more or less expanded, obtuse, dingy brown with a rufous tinge, pale ochraceous when dry; flesh thin, dingy; gills adnate, ventricose, hence looking as if broadly emarginate, scarcely crowded, 2–3 lines broad, umber-brown; stem 2–3 in. long, about 1 line thick, even, glabrous, brownish then paler, not rooting, hollow; spores elliptic-fusiform,  $10 \times 5\text{--}6 \mu$ .

*Agaricus (Psilocybe) foenisecii*, Persoon, Icon. Descr., t. 11, f. 1; Cke., Hdbk., p. 212; Cke., Illustr., pl. 590.

Amongst grass in fields, lawns, &c.

Scattered or in small groups. Rigid, fragile, pileus dark, drying from the apex downwards. Stem straight or often a little flexuous, somewhat resembling superficially *Panaeolus papilionaceus*, but much smaller, and differing in the umber gills and spores.

With somewhat the habit of *Panaeolus*, but the gills are not variegated and the spores are umber. Stem hollow, straight, rigid, fragile, 2–3 in. long, 1–2 lines thick, equal, naked, rufescent, at first paler and powdered with white, subpubescent. Veil absent. Disc of the pileus more especially fleshy, campanulato-convex, obtuse, dry, glabrous,

rugulose in dry weather, pale smoky-brown or brown, becoming pale. Gills adnate, but ventricose in front and thus appearing emarginate, rather distant, not thin, brownish, bright brown, then umber. When half dry the disc becomes pale. (Fries.)

***Psilocybe clivensis*. B. & Br.**

Pileus about 1 in. across, hemispherical, pale brown then pale ochraceous or almost white, even, atomate, margin striate; gills broad, adnate, widely emarginate, broadest in front, subdistant, umber, margin white; stem about  $1\frac{1}{2}$  in. high, 1 line thick, subequal, fistulose, somewhat silky, base subclavate; spores umber,  $10 \times 5 \mu$ .

*Agaricus (Psilocybe) clivensis*, B. & Br., Ann. Nat. Hist., n. 916, pl. xiv. f. 3; Cke., Hdbk., p. 212; Cke., Illustr., t. 969.

On the ground.

When fully developed whitish, plane or even a little depressed, margin indistinctly striate.

***Psilocybe catervata*. Massee.**

Densely fasciculate; pileus  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, campanulate, obtuse, snow-white, even, glabrous, satiny, flesh rather thick, white; stem about 2 in. long, 1 line thick, equal, usually rather wavy, hollow, white, shining, brittle; gills slightly adnexed, rather broad, crowded, grey then brown with a tinge of purple, edge entire, white; spores elliptic-oblong, smooth, brown with a purple tinge,  $12 \times 4 \mu$ ; cystidia fusiform,  $60\text{--}70 \times 12 \mu$ .

On the ground; Carlisle, Oct. 1887. (Dr. Carlyle.)

Not closely allied to any known species; distinguished at once by the densely fasciculate habit and the shining snow-white pileus and stem. Resembling in size and crowded mode of growth, *Galera conferta*, but distinguished by the purple gills and spores, and the pure white pileus at all ages.

**HYPHOLOMA. Fries. (figs. 9, 10, 14, 16, p. 351.)**

Pileus more or less fleshy, margin at first incurved; stem central, its substance continuous with that of the pileus; veil interwoven, adhering in torn fragments to the margin

of the pileus (appendiculate); not forming a distinct ring round the stem; gills adnate or sinuate and adnexed, often seceding (separating from the stem, and then appearing as if free); spores brownish-purple, sometimes intense purple.

*Hypoloma*, Fries, Syst. Mycol. i. p. 287; Cke., Hdbk., p. 202.

Mostly caespitose and growing on wood, when growing on the ground, often springing from buried wood, roots, &c.

Distinguished from *Stropharia* by the absence of an interwoven ring on the stem; when a trace of the ring is present, it is in the form of cobweb-like fibres, and very scanty.

*Hypoloma* agrees in structure with *Hebeloma*, *Entoloma*, and *Tricholoma*.

Veil woven into a loose cobweb-like texture, adhering to the margin of the pileus, not forming a distinct ring round the stem; the last character separates the present genus from *Agaricus*; from *Psathyra* it is known by the stature, habit, and presence of an evident veil. Known amongst allied genera by the tufted mode of growth, growing on wood, pileus not furnished with a separable pellicle, gills in some species almost deliquescent. (Fries.)

#### ANALYSIS OF THE SPECIES.

\* FASCICULARES.—Pileus tough, glabrous, bright coloured, not hygrophanous.

\*\* VISCIDI.—Pileus viscid, naked.

\*\*\* VELUTINI.—Pileus virgate or silky with innate fibrils.

\*\*\*\* FLOCCULOSI.—Pileus covered with superficial floccose scales that eventually disappear.

\*\*\*\*\* APPENDICULATI.—Pileus glabrous, hygrophanous.

#### \* FASCICULARES.

*Hypoloma silaceus*. Pers.

Pileus about 3 in. across, fleshy, convex, viscid, orange-rufous, silky and whitish near the margin; gills adnate, crowded, grey then olive; stem 3 in. long, 3-4 lines thick, fibriloso-striate, shining, base bulbous.



*Agaricus silaceus*, Persoon, Syn., p. 421; Fries, Hym. Eur., p. 421; Secretan, n. 349; Cke., Hdbk., p. 202.

On the ground, solitary, or according to Secretan, caespitose, and springing from a common tuberous base.

Pileus viscid, bright orange-rufous; stem 4 in. high, at length hollow, solid and slightly swollen at the base; smell resembling that of meal. Spores pale purple-brown. (Cooke.)

*Hypholoma sublateritius*. Schaeff. (fig. 16, 351.)

Pileus 2-4 in. across, fleshy, convex then expanded and almost plane, dry, almost glabrous, brick-red tinged with orange, margin paler, flesh compact, whitish, thin at the margin; gills adnate, crowded, about 3 lines broad, whitish then sooty-olive; stem 3-5 in. long, 3-5 lines thick, usually attenuated downwards, fibrillose, rusty or yellowish, stuffed; spores elliptical, sooty-brown,  $8 \times 4 \mu$ .

*Agaricus sublateritius*, Schaeffer, t. 49; figs. 6, 7; Fries, Hym. Eur., p. 290; Cke., Hdbk., p. 202; Cke., Illustr., pl. 557.

On and about old stumps. Subcaespitose, taste bitter, smell almost none. A very fine, showy species, somewhat resembling *Hypholoma fascicularis*, but larger, and differing in the obtuse pileus and stuffed stem.

*Var. Schaefferi*. Fries; Pileus yellow, conical then depressed, rugose; gills narrow, decurrent, even when quite young; stem equal, hollow.

Schaeffer, Icon., t. 49, figs. 4, 5; Fries, Hym. Eur., p. 291; Cke., Hdbk., p. 203.

On trunks, &c. Smaller than the typical form, and altogether yellowish.

*Var. squamosus*. Cooke; Pileus convex, bright brick-red shading to yellow at the margin, spotted with superficial scales, flesh very thick, yellowish, gills narrowish, adnate; stem elongated, stout, pale above, ferruginous below, hollow. Veil appendiculate when young; spores elliptical,  $8 \times 4 \mu$ .

*Agaricus (Hypholoma) sublateritius*, Schaeff., var. *squamosus*, Cke., Hdbk., p. 202; Cke., Illustr., pl. 558.  $\square \quad \dagger$

On trunks. A very beautiful variety, larger and more robust than the typical form.

There are two forms: (A.) *Vulgaris*. Stem stuffed, stout and firm, usually distinctly attenuated downwards, rarely equal, 3-4 in. long, 3-5 lines thick, from the position of growth incurved, fibrillose squamulose, fibrils pale, base ferruginous, veil apical, at first white then blackish, pileus fleshy, convexo-plane, obtuse, even, glabrous, rather tawny but paler and clouded with the remains of the superficial, white, rather silky veil; flesh compact, white then yellowish; gills adnate, more or less crowded, narrow, at first dingy yellowish, base more obscure, then sooty, at length tinged olive. Spores purple-brown. (B.) *Pomposus*. Stem solid, up to 1 in. thick, subannulate, paler above. Pileus thicker, almost entirely tawny. Gills becoming clear olive. (Fries.)

***Hypholoma capnoides*. Fr.**

Pileus 1-1½ in. across, convex, then plane and subumbonate or depressed, dry, very smooth, yellowish or tinged tawny, flesh thin, white; gills adnate, not crowded, 2-3 lines broad, dry, sooty-grey then purplish; stem 2-4 in. long, about 3 lines broad, about equal, silky, even, pallid, brownish under the silkiness, partly hollow; spores elliptical, brownish-purple,  $8 \times 4 \mu$ .

*Agaricus (Hypholoma) capnoides*, Fries, Syst. Myc. i. p. 289; Cke., Hdbk., p. 203; Cke., Illustr., pl. 559.

In pine woods on the ground and on pine trunks; fasciculate.

Smell and taste mild. Stem under the whitish silkiness rusty. Pileus one colour, commonly yellowish, veil becoming purplish.

Caespitose, fasciculate, smell and taste sweet. Stem connate at the base, hollow, 2-3 in. long, 2-4 lines thick, equal, often curved and flexuous, adpressedly silky, pallid, apex white, everywhere striate; when old with a more or less ferruginous down. Veil appendiculate, white, then purple-brown. Pileus fleshy, convex, then expanded, obtuse, dry, glabrous, yellowish-ochre, from 1-3 in. broad. Flesh rather thin, white. Gills adnate, readily separating from the sporophore, rather crowded and broad, dry, at first grey, then purple brown. (Fries.)

***Hypholoma epixanthus*. Fr.**

Pileus 2-3 in. across, thin, convex then almost plane, even,

at first silky then glabrous, pale yellow, disc darker, often tinged tawny; gills adnate, crowded, 3-4 lines broad, pale yellow, becoming clouded with grey; stem 3-5 in. long, 3-5 lines thick, subequal, floccoso-fibrillose, whitish, basal portion brownish, apex mealy, hollow; spores elliptical,  $7 \times 4 \mu$ .

*Agaricus (Hypholoma) epizanthus*, Fries, Epicr., p. 222; Cke., Hdbk., p. 203; Cke., Illustr., pl. 560.

On old fir stumps, &c. Fasciculate. Smell rather strong. Known by the clear pale yellow gills. Not deliquescent.

Stem hollow, about 3 in. long, 3-4 lines thick, attenuated from the base, thickened, or equal, floccoso-fibrillose, pale ferruginous or brownish below, apex mealy. Veil appendiculate, white. Pileus fleshy, rather thin; not hygrophanous, convexo-plane, obtuse or gibbous, 2-3 in. broad, even, silky then almost glabrous, yellow or pallid, disc usually darker. Flesh white, becoming tinged with yellow. Gills adnate, crowded, at first whitish-yellow, at length grey, not deliquescent, neither purplish nor green. Size very variable; smell acid. (Fries.)

#### ***Hypholoma fascicularis*. Huds.**

Fasciculate, intensely bitter. Pileus 1-2 in. across, campanulate-convex then expanded, subumbonate, thin, glabrous, even, tawny, margin yellow; gills adnate, very crowded, narrow, yellow then greenish, subdeliquescent; stem 3-4 in. long, 2-3 lines thick, fibrillose, yellow, as is also the flesh, curved or flexuous, hollow; veil sometimes appendiculate; spores elliptical,  $7 \times 4 \mu$ .

*Agaricus fascicularis*, Hudson, Flor. Angl., p. 615; Fries, Syst. Myc. i. p. 288; Cke., Hdbk., p. 203; Cke., Illustr., pl. 561 and 562 (the latter called *Ag. fascicularis*, var. *elaeodes*, Fr.)

On old stumps, &c.

Gregarious, densely caespitose. Pileus 2 in. broad, at first conic then expanded, more or less irregular from the tufted mode of growth, subcarnose, thick in the centre, tawny, the margin thin, yellow, with portions of the veil adhering to it, often stained with the ferruginous-purple spores. Gills green, clouded, adnate, with a subdecurent tooth. Spores elliptic. Stem 2-9 in. high, 2 lines thick, curved and unequal, hollow, fibrillose or squamulose, yellow, greenish above. Ring stained with the spores, leaving

scarcely any trace upon the stem. Taste very bitter and nauseous. (Berk.)

Smell and taste bitter, flesh yellow, gills rather deliquescent, sulphur-colour, then greenish. Forming large, densely crowded tufts, stems very numerous, hollow, thin, incurved or flexuous, fibrillose, length very variable, pileus often thin, convex then expanded, subumbonate or obtuse, even, glabrous, dry, yellow, disc usually darker; gills adnate, very much crowded, linear, more or less dingy green. (Fries.)

Tufted, pileus 1-2 in. broad, plano-convex, somewhat umbonate, glabrous, extremely thin at the margin, of a yellowish, reddish-buff, or brownish-orange colour. Lamellae numerous, mostly eight in a series, rather narrow, adnate, yellowish at first, afterwards greenish and mottled with the sporidia. Stipes slender, cylindrical, equal, firm, hollow, of a yellow colour, 2-9 in. in length, and 2-3 lines in thickness. Veil a delicate curtain, becoming blackish, but mostly so evanescent as to leave only a stain upon the stipes. Taste intensely bitter.

One of the common Agarics, abounding at the base of old trees, and gate-posts in a state of decay, and similar situations. The dense clusters it forms are frequently composed of several hundred plants, and the stems, which accommodate themselves in length and direction to their situation, are so crowded and compressed at their base as to appear more or less united in bundles, whence the origin of the specific name. In general habit this species resembles *A. velutipes*, a plant confined to the same kind of station; and still more nearly *A. lateritius* (= *sublateritius* of this work), a very distinct species, to which *A. pomposus* of Bolton must be referred. (Grev.)

***Hypholoma elaeodes*. Fr.**

Pileus  $\frac{3}{4}$ -1 $\frac{1}{2}$  in. across, convex, then almost plane, subumbonate, dry, glabrous, even, brick-red, flesh yellow; gills adnate, crowded, thin, green, then pure olive; stem 2-4 in. long, 2 lines thick, curved, or flexuous, equal, fibrillose, more or less ferruginous, stuffed then hollow.

*Agaricus* (*Hypholoma*) *elaodes*, Fries, Epicr., p. 222; Hym. Eur., p. 291.

On trunks and on the ground.

Fasciculate; smell sour. Closely allied to *Hypholoma fascicularis*, but distinguished by the brick-red pileus, ferruginous stem, and persistent, pure olive gills.

***Hypholoma instratus*. Britz.**

Caespitose; Pileus  $\frac{3}{4}$ –1½ in. across, hemispherical, convex, broadly umbonate, dark brown, radiately rugose; gills adnate, subventricose, 3 lines broad, brown, then purple-brown, margin paler; stem 2–3 in. high, about 2 lines thick, equal, white and smooth above, fibrillose or squamulose below, base becoming brownish, hollow; veil white, appendiculate; spores elliptical, purple-brown,  $8 \times 4 \mu$ ; flesh of pileus and stem brownish.

*Agaricus (Hypholoma) instratus*, Britzelmeyer, Melan., fig. 10; Cke., Hdbk., p. 377; Cke., Illustr., pl. 1157.

On stumps. Known at once by the persistently dark brown, radiato-rugose pileus.

Possibly these specimens belong to the above species of Britzelmeyer, but we have been compelled to expand the description. (Cooke.)

***Hypholoma dispersus*. Fr.**

Pileus  $\frac{3}{4}$ –1 in. across, campanulate then expanded, obtuse, even, silky round the margin from the veil, tawny, honey-colour near the margin; gills adnate, thin, 2–3 lines broad, rather ventricose, crowded, straw-colour, becoming clouded and with a greenish tinge; stem 2–4 in. long, 2 lines thick, equal, straight or almost so, tough, silky-fibrillose, pale, base brownish; spores elliptical,  $7 \times 3\text{--}4 \mu$ .

*Agaricus (Hypholoma) dispersus*, Fries, Epicr., p. 222; Cke., Hdbk., p. 203; Cke., Illustr., pl. 586; Saund. & Smith, t. 24, f. 1–3 (an elongated form).

On trunks and on the ground. Usually scattered.

Stem altogether equal, straight, 2–3 in. long, 1 line thick, for the greater part rusty-brown, apex pale. Pileus tawny, honey-colour. Gills 2–3 lines broad, obscure greenish. (Fries.)

On the ground and on trunks, solitary, scarcely ever caespitose. Stem hollow, 2 in. or more long, 2 lines thick, equal, straight, tough, silky-fibrillose, become ferruginous, base brownish, apex pale. Pileus rather fleshy, convex, then

expanded,  $1\frac{1}{2}$  in. broad, even, superficially silky round the margin from the veil, or squamulose, the remainder even and glabrous, tawny, honey-colour, not hygrophanous. Flesh thin, paler in colour than the pileus; gills adnate, thin, ventricose, broader (3-4 lines) than in *Hypholoma fascicularis*, crowded, at first pale straw-colour, then clouded, obsolete greenish. (Fries.)

## \*\* VISCIDI.

### *Hypholoma incomptus*. Massee.

Pileus 3-4 in. across, campanulate then expanding, broadly gibbous, even, viscid when moist, margin usually flexuous, deep bay-brown, becoming slightly silky and orange-tawny when dry; flesh 2 lines thick, tawny, as is also that of the stem; gills slightly rounded behind, adnate, crowded, 3-4 lines broad, thin, pallid then deep olive, finally clouded with purple from the spores; stem about 3 in. long,  $\frac{3}{4}$  in. thick, equal, pale above, dark ferruginous below, covered with minute, spreading, ferruginous, fibrillose squamules, mixed with primrose-yellow tomentum, hollow, cavity small; spores purplish, obliquely elliptical,  $8 \times 3-5 \mu$ .

On stumps. Easily distinguished by the viscid, dark-bay pileus, and the broad dark-olive gills clouded with purple.

### *Hypholoma oedipus*. Cke. (figs. 10, 14, p. 351.)

Pileus  $\frac{1}{2}$ -1 in. across, glutinous, fleshy in the centre, membranaceous at the margin, at first turbinate or hemispherical, with a ragged margin (which separates from the inferior, very visible, and slightly darker evanescent ring), then convex, with an even margin, smooth, dull, hygrophanous, disc umber, becoming pallid at the margin, which extends slightly beyond the gills. Stem 2 in. long, 2 lines thick, enlarging downwards to a bulbous base, solid, fibrillose below, pruinose above the median ring. Gills at first whitish, becoming umber, adnate by their entire breadth, sometimes with a minute decurrent tooth, plane, with a somewhat granular margin. Spores dark brown.

*Agaricus (Hypholoma) oedipus*, Cke., Grevillea, vol. xiv. p. 1; Cke., Hdbk., p. 204; Cke., Illustr., pl. 587A.

Attached to decayed sticks or dead leaves. Solitary or in  
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groups of two or three individuals. A very distinct species, characterised by the distinctly bulbous base of the solid stem.

\*\*\* VELUTINI.

*Hypholoma storea*. Fr.

Pileus 3 in. across, fleshy, convexo-plane, umbonate, usually depressed round the umbo, dry, fibrillose, pale brownish or dingy pale ochraceous; gills adnate, dry, livid-brownish, margin white, serrulate; stem 4-5 in. long, 4 lines thick, firm, solid, equal, even, rather fibrillose, pallid.

*Agaricus (Hypholoma) storea*, Fries, Epicr., p. 223; Fries, Hym. Eur., p. 293; Cke., Hdbk., p. 204.

On decayed beech trunks, &c.

On a decayed part of a living beech trunk, found in 1815; and again appearing from the same crack in 1833. Firm, solitary, not hygrophanous, in which it differs from *H. lacrymabundus*, *H. pyrotrichus*, &c., with the habit of *Inocybe*. Stem solid, 4-5 in. long, 4 lines thick, equal, round, even, rather fibrillose, pallid. Pileus fleshy, convex, broadly umbonate, rather depressed round the umbo, about 3 in. broad, the entire surface broken up into adnate longitudinal fibrils, (rarely squarrose); becoming dingy brownish. Veil appendiculate from the margin, the fibrils continuous with those of the pileus. Flesh white, compact, not thick. Gills adnate, with a decurrent tooth, livid-greyish, at length brown, edge at first white and serrulate; spores brown, not purple-brown. (Fries.)

*Hypholoma hypoxanthus*. Phil. & Plow. (fig. 9, p. 351.)

Caespitose. Pileus about 2 in. across, umbonate, moist, viscid, dirty white, umbo darker, brownish, squamulose with minute black fibrillæ, which are evanescent; gills purple-brown, crowded, narrow, edge white, adnate, seceding, sometimes forked; pileus subcarnose, except the centre, which is a thick fleshy umbo; stem 2-4 in. high, 3 lines thick, curved, hollow, incrassated below, whitish, smooth above, floccoso-squamose below; base with a distinct yellow tinge; mycelium orange-yellow; spores elliptical,  $5 \times 2-2.5 \mu$ .

*Agaricus (Hypholoma) hypoxanthus*, Phillips & Plowright, Grevillea, vol. xiii. p. 48.

*Agaricus (Hypholoma) storea*, Fries, var. *caespitosa*, Cke., Hdbk., p. 204; Cke., Illustr., pl. 543 (the yellow base of the stem and the orange mycelium not shown).

It is always caespitose, and has hitherto occurred either on rotten beech-wood or under beech-trees. (Phil. & Plow.)

### *Hypholoma lacrymabundus*. Fr.

Pileus 2-3 in. across, fleshy, convex, obtuse, piloso-squamose with darker innate squamules, at first white then brownish; flesh white; gills about 3 lines broad, adnate, crowded, brownish-purple, beaded with drops of moisture in wet weather; stem 2 in. long, 3 lines thick, equal, or slightly thickened at the base, fibrilloso-squamose, whitish then brownish, hollow; spores elliptic-fusiform, purple-brown,  $9 \times 4 \mu$ .

*Agaricus lacrymabundus*, Fries, Syst. Myc. i. p. 287; Cke., Hdbk., p. 205; Cke., Illustr., pl. 566?

On the ground and on trunks. Truly caespitose.

Smaller than *H. pyrotrichus* and *H. velutinus*, but firmer, truly fleshy, not hygrophanous. Veil white, spores purple-brown. Pileus and stem at first white, then brownish. A very distinct species, but often confounded with the above-mentioned species. (Fries.)

Cooke's figure quoted above differs from Fries' description in many particulars, as the solid stem, adnexed gills, &c.

From *H. pyrotricha* and *H. velutina*, with which it has been confounded, it is quite distinct in the fleshy, not hygrophanous pileus; truly caespitose, firm; stem hollow, 2 in. long, 3-4 lines thick, base rather incrassated, fibrilloso-squamose, brownish-white. Veil discrete, fibrillose, appendiculate, white. Pileus truly fleshy, but not very compact, convex, obtuse, 2-3 in. broad, piloso-squamose, squamules innate, darker, white when young, then brown, becoming paler towards the margin. Pileus often irregular from mutual pressure. Flesh white. Gills adnate, crowded, 3 lines broad, whitish, then like the spores brownish-purple, edge white, and in rainy weather beaded with drops of moisture. (Fries.)



**Hypholoma velutinum.** Pers.

Pileus 2-4 in. across, rather fleshy, campanulate then expanded, at length obtusely umbonate, even, at first tomentose with adpressed fibrils, then almost glabrous, hygrophanous, flesh very thin, coloured like the pileus; stem 3-4 in. long, 3-5 lines thick, hollow, silky-fibrous, dirty clay-colour; gills separating from the stem, rather crowded, brownish then bay-brown, spotted with black; spores elliptical,  $10 \times 5 \mu$ .

*Agaricus velutinus*, Persoon, Syn., p. 409; Fries, Hym. Eur., p. 293; Cke., Hdbk., p. 205; Cke., Illustr., pl. 563.

Amongst grass, &c. Size variable, often very large, fragile. Not caespitose.

Subcaespitose, fragile; stem hollow, up to 4-5 in. long,  $\frac{1}{2}$  in. and more thick in the largest forms, in smaller forms 2 in. long, 2 lines thick, equal, silky-fibrillose, tomentose above from the veil, dingy clay-colour; veil especially attached to the margin of the pileus, woolly, at first white, then blackish; pileus rather fleshy, campanulate then expanded, at length obtusely umbonate, not squamose, but when young entirely tomentose with adpressed fibrils, at length almost glabrous and even, 2-4 in. broad, livid when fresh, tawny when half dry, dirty clay-colour when dry. Flesh very thin, coloured like the pileus, fragile. Gills adfixed and readily seceding (almost free), broad (4-5 lines in larger form), not crowded, at first brownish, margin white, then bay-brown, spotted with black. (Fries.)

**Hypholoma velutinum.** Pers.  *$\beta$ . leiocephalus.*

Pileus hygrophanous, rugged, smooth except at the margin, which like the stem is fibrillose, apex of stem farinose.

On old stumps.

Densely caespitose; much smaller than the common form, but apparently a mere variety, though a very striking one, from its smooth, but very rugged disc. (B. & Br.)

**Hypholoma pyrotrichum.** Holmsk.

Pileus 2-4 in. across, rather fleshy, conical, then hemispherical, obtuse, covered with orange-tawny fibrils collected

into minute rather adpressed squamules, flesh and veil tawny; stem 3-4 in. long, 3-5 lines thick, equal, fibrillose or with squarrose squamules, becoming tawny, hollow; gills adnate, pallid then brownish, 2-3 lines broad; spores elliptical,  $11 \times 6 \mu$ .

*Agaricus pyrotrichus*, Holmskiöld, Ot. ii. t. 35; Cke., Hdbk., p. 205; Cke., Illustr., pl. 564.

On the ground near trunks, stumps, &c. Caespitose. Very showy, pileus often bright orange-tawny, veil fringing the margin, which is a little incurved. Stem fibrous, soft, often with squarrose squamules.

Tufted, rather firm. Stem hollow, fibrous, soft, 2-3 in. long, 2-3 lines thick, equal, or very slightly thickened at the base, fibrillose, commonly squarrosely squamulose, becoming tawny. Veil conspicuously appendiculate, tawny. Pileus rather fleshy, at first hemispherical, obtuse, then expanded, 3 in. broad, densely covered with tawny fibrils that are collected into minute subdepressed squamules, colour hence tawny or orange-tawny, persistent. Flesh tawny. Gills adnate, rather crowded, broad, at first pallid, margin flocculose, white, then brownish, at length free. (Fries.)

*Var. egregius*. Massee.

Pileus 2-3 in. across, convex, obtuse, ochraceous, with numerous small, orange-red squamules, margin incurved, fringed with the remains of the veil, flesh thick in the centre, becoming very thin towards the margin; stem 4-5 in. long,  $\frac{3}{4}$  in. thick, hollow, pale ochraceous, below the ring covered with spreading squarrose whitish scales, above the ring smooth; gills crowded, broadly adnate,  $\frac{1}{4}$  in. broad, purple-brown, margin white; spores broadly elliptical or nearly globose, apiculate, purple-brown, smooth,  $6 \times 4-5 \mu$ , cystidia none.

In a fir wood, Scarborough, October, 1880. Fasciculate, near to stumps. Differs from the typical form in the densely shaggy stem. Flesh of pileus and stem pale ochraceous.

\*\*\*\* FLOCCULOSI.

*Hypholoma cascus*. Fries.

Pileus 1-2 $\frac{1}{2}$  in. across, rather fleshy, oval then expanded,

soft, almost glabrous, rugulose, dingy greyish ochre then pale, disc obtuse, even; gills rounded behind and adnexed, ventricose, dry, 3-4 lines broad, greyish then blackish-brown, edge whitish; stem 2-4 in. long, 2-3 lines thick, equal, fibrillose, white, rather pruinose, hollow.

*Agaricus (Hypholoma) cascus*, Fries, *Epicr.*, p. 224: Cke., *Hdbk.*, p. 205; Cke., *Illustr.*, pl. 544.

In grassy places. Gregarious; fragile.

Terrestrial, gregarious, not caespitose, very fragile. Stem hollow, equal, 3-4 in. long, 2-3 lines thick, fibrillose, white, apex slightly powdered with white meal. Veil appendiculate at the margin of the pileus, squamulose, white, and in the young stage forming white squamules on the pileus, which soon disappear. Pileus rather fleshy, oval then expanded, obtuse,  $1\frac{1}{2}$ -3 in. broad, glabrous, livid-grey, truly soft, rugulose, and whitish clay-colour when dry; disc very persistently even. Gills rounded, adnexed, ventricose, up to 4 lines broad, dry, fragile, grey then blackish-brown, edge whitish. (Fries.)

***Hypholoma punctulatus*. Kalchbr.**

Caespitose. Pileus about 1 in. across, flesh thin, convex, obtuse, margin involute and the centre rather depressed, dry, pallid, with a yellowish or brownish tinge, minutely squamulose from the very delicate veil, at length naked; flesh pale brownish, tawny towards the base; gills 2-3 lines broad, sinuato-adnate, with a decurrent tooth, rather crowded, edge entire, pallid then pale-umber; stem 1-2 in. long, 2-3 lines thick, fleshy-fibrous, stuffed, equal or rather bulbous at the base, pallid, squamuloso-fibrillose up to the ring, glabrous above; ring superior or near the apex, thin, formed of fibrils clustered to form a zone, fugacious; spores brown.

*Agaricus (Pholiota) punctulatus*, Kalchbrenner, *Icon. Sel. Hung.*, p. 25, pl. 14, f. 2.

*Agaricus (Stropharia) punctulatus* (Kalchbr.), Fries, *Hym. Eur.*, p. 282.

*Agaricus (Hypholoma) punctulatus*, Cke., *Hdbk.*, p. 206; Cke., *Illustr.*, pl. 587 s.

On rotten twigs and on chips lying on the ground. Densely tufted.

As seen from the synonyms given above, there appears to be some uncertainty as to the correct genus to which the present fungus belongs, but, judging from the figure and description, it belongs to the present genus.

\*\*\*\*\* APPENDICULATI.

**Hypholoma lanaripes.** Cke.

Pileus  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. across, rather fleshy, campanulate, then expanded with the margin upturned and the centre conical, hygrophanous, squamose, with superficial scales arising from the breaking up of the cuticle, pallid or pale dingy buff; veil attached to the margin in small, fugacious patches; gills adnexed, crowded, about 2 lines broad, whitish then purplish-brown; stem 2–3 in. long, about 2 lines thick, equal, fragile, rather fibrillose, white, tomentose at the base, hollow, brownish within.

*Agaricus (Hypholoma) lanaripes*, Cke., Seem. Journ. Bot. (1863), p. 66, t. 3, f. 2; Cke., Hdbk., p. 206; Cke., Illustr., pl. 545.

On soil in conservatories.

A very distinct species, recognised by the scaly, pallid pileus, which at maturity is broadly conical in the centre, and more or less upturned at the margin.

**Hypholoma Candolleanus.** Fr.

Pileus  $1\frac{1}{2}$ –3 in. across, slightly fleshy, campanulato-convex then expanded, obtuse, glabrous, hygrophanous, bay when moist, almost white with the disc ochraceous when dry; flesh white; veil appendiculate; gills rounded behind and adnexed, crowded, pale-violet then cinnamon-brown, narrow; stem 2–3 in. long, 2 lines thick, rather fibrillose, hollow, white; spores elliptical,  $8 \times 4 \mu$ .

*Agaricus Candolleanus*, Fries, Syst. Myc. i. p. 296; Cke., Hdbk., p. 206; Cke., Hdbk., pl. 546.

On stumps and on the ground. Caespitose.

Colour of the pileus and gills very variable, depending on the amount of moisture. The appendiculate veil and gills violet at first, readily distinguish the present species. Base of stem solid and slightly incrassated. Pileus whitish, apex ochraceous, but bay at first. Flesh white. (Fries.)

Distinguished amongst its allies by the gills being at first pretty obscure violet, never flesh-colour. Densely caespitose, fragile, very hygrophanous. Stem fistulose, 3 in. long, 3-4 lines thick, base solid, rather thickened, fibrillose, white, apex striate. Veil curtain-like, appendiculate, white then yellowish. Pileus rather fleshy, glandiform then campanulate, soon convex and at length expanded, obtuse, unequal, 2-4 in. broad, smooth, even, bay then whitish, disc subochraceous. Flesh thin, white. Gills rotundato-adnexed, then separating (from the stem), crowded, violet then brownish-cinnamon, edge at first whitish. (Fries.)

***Hypholoma appendiculatus*. Bull.**

Pileus 2-3 in. across, flesh thin, ovate then expanded, glabrous, hygrophanous, bay-brown, becoming white with an ochraceous tinge, rugose, and rather atomate when dry; gills adnexed, crowded, dry, rather narrow, whitish then brownish flesh-colour; stem 2-3 in. long, 2-3 lines thick, equal, glabrous, apex mealy, white, hollow; spores elliptical,  $5 \times 2.5 \mu$ .

*Agaricus appendiculatus*, Bulliard, Champ., t. 392 (including *H. Candolleanus*); Cke., Hdbk., p. 206; Cke., Illustr., pl. 547.

On stumps and trunks. Caespitose.

Gills brown-red to chocolate, four in a set; pileus white to brown, conical, blunt. Stem white, smooth, splitting. . . . Growing in crowded patches; the pileus often splits to its centre, as represented in Bulliard's fig. C. The curtain hanging like a fringe from the edge of the pileus, is very fugacious, and will not be found many minutes after the pileus is fully expanded. (Purton.)

Densely caespitose, very fragile and hygrophanous. Gills whitish then brownish flesh-colour, distinguishes the present from *H. Candolleanus*, but this character agrees with *Psilocybe spadicea*, which is clearly separated by the total absence of a veil, and by being more robust and rigid. Stem fistulose, 3 in. long, 2-3 lines thick, equal, glabrous, white, apex pruinose; veil, as in *H. Candolleanus*, fimbriate, fugacious, white. Pileus fleshy-membranaceous, thinner than in *H. Candolleanus*, ovate then expanded, at length flattened, obtuse, 2-3 in. broad, glabrous, bay then tawny;

when dry truly rugulose, rather atomate, ochraceous becoming pale. Gills subadnate, crowded, dry, white then flesh-colour, at length brown. (Fries.)

**Hypholoma catarius.** Fr.

Pileus  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, flesh thin, hemispherical, then expanded, even, glabrous, hygrophanous, ochraceous, becoming paler when dry; gills adnate, narrow, rather crowded, whitish then brown; stem 1– $1\frac{1}{2}$  in. long, 1– $1\frac{1}{2}$  line thick, equal, white, rather shining, base incrassated and covered with white floccose down, apex striate, hollow; ring superior, fugacious, often attached in fragments to the margin of the pileus; spores elliptic-oblong,  $6 \times 3 \mu$ .

*Agaricus (Hypholoma) catarius*, Fries, Hym. Eur., p. 296; Cke., Illustr., pl. 1176; Cke., Hdbk., p. 337.

*Agaricus felinus*, Passerini (not of Persoon).

On the ground amongst grass.

Gregarious, subcaespitose, ochraceous, pileus scarcely 1 in. diameter. Stem about  $1\frac{1}{2}$  in. long. Spores  $6 \times 3 \mu$ . (Cooke.)

**Hypholoma leucotephrum.** B. & Br.

Tufted; pileus 2–3 in. across, at first pallid, subcampanulate, rugose, then convexo-expanded and whitish; gills narrow,  $1\frac{1}{2}$  line broad, slightly adnate, greyish-white, grey, then blackish; stem 3–4 in. high,  $\frac{1}{4}$  in. thick, silky-fibrous below, apex striate or sulcato-striate, fistulose, ring ample, here and there appendiculate from margin of pileus; spores purple-brown,  $10 \times 6 \mu$ .

*Agaricus (Hypholoma) leucotephrus*, B. & Br., Ann. Sci. Nat., n. 1256; Cke., Illustr., t. 548.

In large masses at the base of ash-trees. This is clearly different from *A. Candolleanus* and *A. appendiculatus*. The pileus is not of a rich brown when young, nor are the gills when old at all brown. (B. & Br.)

**Hypholoma egenulus.** B. & Br.

Solitary. Pileus  $1\frac{1}{2}$  in. across, hemispherical then expanded, umbonate, watery white, when dry snow-white, not decidedly rugose or atomate, quite smooth as if gummed, margin finely striate, appendiculate; gills slightly ventricose, adnate with a decurrent tooth, rather distant, purplish-

umber, margin white; stem 2 in. high,  $1\frac{1}{2}$  line thick, attenuated upwards or nearly equal, fistulose, minutely adpresso-squamose; spores purple-brown.

*Agaricus (Hypholoma) egenulus*, B. & Br., Ann. Nat. Hist., n. 915; Cke., Illustr. t. 605 A; Cke., Hdbk., p. 207.

On the ground amongst grass. Has exactly the habit of Schaeff. t. 205 (*A. cernuus*); but that belongs to a different section. The nearest ally is *A. appendiculatus*.

***Hypholoma pilulaeformis*. Bull.**

Pileus  $\frac{3}{4}$ – $1\frac{1}{2}$  in. across, rather membranaceous, globose then expanded, obtuse, even, glabrous, brown when moist, dingy ochraceous when dry; gills adnexed, separating from the stem, thin, white, then becoming brownish; stem about 1 in. long and 1 line thick, glabrous, white, hollow; veil interwoven, at first forming a ring.

*Agaricus pilulaeformis*, Bulliard, Champ., t. 112; Fries, Hym. Eur., p. 296; Fries, Mon. i. p. 428.

On mossy trunks.

Resembles a diminutive form of *H. appendiculatus*, differing more essentially in the gills never assuming a flesh-coloured tinge. In habit resembling *Psathyrella disseminata*, very crowded and fragile. Stem hollow, 1 in. long, 1 line thick, flexuous, glabrous, white, apex naked. Veil evident, interwoven, in young specimens ring-like. Pileus almost membranaceous, globose then expanded, obtuse, 1 in. and more broad, even, smooth, brown when moist, dingy ochraceous when dry. Gills adnexed, readily separating, thin, narrow, linear, dry, white then grey, at length brownish. (Fries.)

***Hypholoma hydrophilus*. Bull.**

Pileus 1–2 in. across, flesh thin, convex then expanded and almost plane, obtuse, rather wavy sometimes, hygrophanous, rugose, disc even, margin slightly inturned and split, tawny-ochraceous when dry; gills adnexed, ventricose, about 2 lines broad, crowded, exuding drops of water, pallid, then brownish-cinnamon; stem about 2 in. long, 2–3 lines thick, adpressedly fibrillose, apex rather mealy, pallid, usually curved, hollow; spores elliptical, rusty-cinnamon,  $5 \times 3 \mu$ .

*Agaricus hydrophilus*, Bulliard, Champ., t. 511; Fries, Monogr. i. p. 427; Cke., Hdbk., p. 207; Cke., Illustr., pl. 605 B.

*Bolbitius hydrophilus*, Fries, Hym. Eur., p. 333.

At the base of trunks, stumps, &c. Caespitose. Somewhat resembling *Psilocybe spadicea*, but distinguished by the absence of a rosy tint in the gills and by the small ferruginous spores. Considered by Fries in his latest work as a species of *Bolbitius*.

Veil very fugacious. Often absent. Pileus pale tawny when dry. General structure that of the appendiculate species of *Hypholoma*, but differing in the obsolete veil, and small, ferruginous spores. (Fries.)

The veil though fugacious, at once distinguishes it (*Hypholoma hydrophilus*) from some other species with which it might easily be confounded. (Berk.)

Very similar to *H. appendiculatus* but widely different in the gills exuding drops of water, and in this feature agreeing with *H. velutinus*. Very caespitose and fragile. Stem fistulose, 2 in. long, 2 lines thick, rather curved and often compressed, fibrillosely reticulated under a lens, at first white then becoming ferruginous, apex obsoletely mealy. Veil marginal, fimbriated, white, fugacious. Pileus fleshy-membranaceous, bullate, then convex, finally expanded, often very irregular from mutual pressure, about  $1\frac{1}{2}$  in. across; moist, even, bay, when growing; rugose (the prominent disc even) when dry, margin incurved, undulate. Flesh very thin, readily splitting, pure white when dry. Gills adnate, ventricose, and sometimes appearing to be almost free, crowded, watery, exuding drops of water, bay-brown. Spores more evidently ferruginous than in the other species. (Fries.)

STROPHARIA. Fries. (figs. 8, 17, p. 351).

Pileus somewhat fleshy, often with a viscid pellicle; stem central, its flesh continuous with that of the pileus; veil present, forming a distinct ring round the stem; gills adnate or adnexed, becoming dark brown or purplish.

*Stropharia* (as a subgenus), Fries, Monogr. i. p. 408; Cke., Hdbk., p. 197.



Distinguished amongst the *Porphyrospora* by the presence of a distinct ring in conjunction with adnate or adnexed gills.

The species usually grow on the ground or on dung.

*Stropharia* corresponds with *Pholiota* and *Armillaria*.

Agreeing with *Psalliota* in having a distinct ring on the stem, but differing much in other respects, especially in having the substance of the stem continuous with that of the pileus, and in the structure, and more or less adnate attachment of the gills to the stem. (Fries.)

#### ANALYSIS OF THE SPECIES.

A. VISCIPELLES.—Pileus with an even or squamose, often viscid pellicle.

\* MUNDI.—Not growing on dung.

\*\* MERDARI.—Ring often incomplete.

B. SPINTRIGERI.—Pileus without a pellicle, but innato-fibrillose; not viscid.

#### A. VISCIPELLES.

##### \* *Mundi*.

##### *Stropharia Percevali*. B. & Br.

Pileus  $1\frac{1}{2}$ –2 in. across, slightly viscid, fleshy, ochraceous, umbonate, then expanded, here and there, especially towards the margin, with white floccose squamules that eventually disappear; flesh at length dull umber; gills broad,  $\frac{1}{2}$  in., adnexed, distant, white, then greyish, finally pale umber; stem 2–3 in. high,  $\frac{1}{2}$ – $\frac{1}{4}$  in. thick at base,  $\frac{1}{4}$  in. above, transversely squamose, hollow, pale above, ring narrow, more or less persistent, umber within; spores  $12\text{--}14 \times 6 \mu$ .

*Agaricus (Stropharia) Percevali*, B. & Br., Ann. Nat. Hist., n. 1767; Cke., Hdbk., p. 197; Cke., Illustr. t. 550.

On sawdust and rotten wood. Allied to *A. squamosus*, but quite distinct.

##### *Stropharia versicolor*. With.

Pileus fleshy, convexo-plane, scaly, scales of the disc

crowded; stem spongy, stuffed, bulbous, whitish then brownish, ring persistent; gills decurrent, pallid, then reddish-brown.

*Agaricus versicolor*, Withering, Bot., vol. 4, p. 158; Cke., Hdbk., p. 197.

On the ground.

Pileus 1-4 in. broad, scurfy, especially in the centre; convex, at length flat, but the edge much curled in. Gills decurrent. Stem 2 in. high, as thick as a swan's quill, thickest downwards. (With.)

The present species has not been found since Withering's time, hence little is known about it. The decurrent gills suggest that the present genus is not its proper place, but for the present it is left here in deference to the opinion of previous authors.

***Stropharia aeruginosa*. Curt. (fig. 3, p. 351.)**

Pileus 2-3 in. across, fleshy, convex then almost plane, rather umbonate, covered with bluish-green mucus that eventually disappears, leaving the pileus pale straw-colour or pallid, smooth or at first with scattered white squamules; gills adnate, 3 lines broad, soft, brown then purplish; stem about 3 in. high; equal, viscid, squamosely fibrillose below the ring, smooth above, greenish, hollow; spores elliptical,  $10 \times 5 \mu$ .

*Agaricus aeruginosus*, Curtis, Flor. Lond., t. 309; Cke., Hdbk., p. 197; Cke., Illustr., pl. 551.

On the ground and on wood; in pastures and woods. A very beautiful species; bright bluish-green before the glutinous pellicle disappears; when growing in woods the pileus is often adorned with snow-white, scattered squamules.

The typical and very elegant form occurs late in the autumn in woods, large (pileus also, stem 3 in. and more), stem with white squarrose squamules, pileus with scattered white squamules, with an intensely aeruginous or bluish pellicle, very glutinous. From this form a series occur having the gluten of the pileus soon disappearing, as also do the squamules from the pileus and stem, and the pileus becomes yellowish. A smaller form occurs in sunny pastures, stem scarcely 2 in. long, 2 lines thick, greenish-blue, without squamules; pileus 1-2 in. broad, pale greenish-blue then

yellowish, less viscid. In this form the ring is incomplete, whereas in the type it is spreading, entire, persistent.

The essential points of this species are: stem hollow, soft, equal, squamulose or fibrillose, and viscid below the ring at first, more or less bluish-green, ring distant; pileus fleshy but not compact, campanulato-convex then expanded, sub-umbonate (in most cases obtuse), with a viscid pellicle, ground yellowish but from the mucus bluish; gills adnate, plane, 2 lines and more broad, not crowded, soft, whitish, then brown, finally with a purple shade. Sometimes caespitose. (Fries.)

***Stropharia albo-cyanea.* Desm.**

Pileus  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, rather fleshy, convexo-campanulate, then expanded, umbonate, even, viscid, bluish-green then pale; gills narrowly adnexed, narrow, pale flesh-colour, then brown, at length purplish; stem 1–2 in. long, 1 line thick, equal, flexuous, dry, even, whitish or tinged with green, hollow; ring present but incomplete; spores elliptical, brownish-purple,  $7-8 \times 3-4 \mu$ .

*Agaricus albo-cyaneus*, Desmaz., Catal., p. 22; Cke., Illustr., pl. 552; Cke., Hdbk., p. 198.

On the ground and on dung. The pileus often becomes tinged with straw-colour when dry. Smaller, more slender, and softer than *S. aeruginosa*, pellicle of the pileus also thinner, and not readily separable.

Stem hollow, soft, at length fragile, about 2 in. long, 3–4 lines thick, equal, ascending or flexuous, almost naked below the ring, not viscid, white. Ring some lines distant, white, or stained with the brown spores, stem above the ring mealy. Pileus fleshy, convex, then plane, glabrous, always naked (not squamose) and viscid, but the gluten is limpid, not coloured, white and shining when young, then bluish-green. Flesh soft, watery. Gills adnate, thin, scarcely crowded, rather broad, at first white, then rather sinuate, brownish. Sometimes caespitose. Pellicle of the pileus scarcely separable. (Fries.)

***Stropharia Worthingtoni.* Fr.**

Pileus about 1 in. across, flesh thin, campanulate, even, smooth, viscid, yellow; stem 2–3 in. long, 1 line or more

thick, flexuose, smooth, dark blue, fistulose; ring incomplete, distant; gills adnate, broad, cinnamon-brown; spores elliptical, brown,  $7 \times 4 \mu$ .

*Agaricus (Stropharia) Worthingtoni*, Fries, Hym. Eur., p. 286.

*Agaricus (Stropharia) albo-cyaneus*, Smith & Saund., pl. 29, f. 1-5 (not of Desmaz.).

On the ground, in pastures, &c. Allied to *Stropharia albo-cyanea*, but distinguished by the yellow pileus and the firmer, larger stem.

### ***Stropharia inuncta*. Fr.**

Pileus  $\frac{3}{4}$ -1 in. across, slightly fleshy, convex or campanulate then expanded, rather umbonate, even, glabrous, soft, at first covered with a livid-purplish glutinous pellicle that disappears leaving the pileus pale; gills adnate,  $1\frac{1}{2}$  line broad, ventricose, pale then dilute brown; stem 2-3 $\frac{1}{2}$  in. long,  $1\frac{1}{2}$  line thick, flexuous, soft, white, silky-fibrillose below the distant, imperfect, fugacious ring, stuffed or hollow; spores elliptical,  $8 \times 6 \mu$ .

*Agaricus (Stropharia) inunctus*, Fries, Elenchus, p. 40; Cke., Hdbk., p. 198; Cke., Illustr., pl. 534.

Amongst grass. Fries distinguishes two forms:—

*Lundensis*, pileus convex then expanded, stem stuffed.

*Upsaliensis*, pileus convex then plane, distinctly umbonate, stem hollow.

Gregarious, subcaespitose. Stem fistulose, 3 in. long, thin, equal, sometimes flexuous, often decumbent, very soft, dry, white, silky-fibrillose below the distant, fugacious ring. Pileus fleshy, convexo-plane, subumbonate, pelliculose, one rarely 2 in. across, viscid, glabrous, pale yellow, but livid purple from the dense gluten with which it is at first covered, margin slightly striate. Flesh thin, soft, white. Gills adnate, with a decurrent tooth, 3 lines broad, scarcely crowded, whitish then brownish. Spores purple-brown. (Fries.)

### ***Stropharia coronilla*. Bull.**

Pileus 1-1 $\frac{1}{2}$  in. across, fleshy, hemispherical then expanded, even, slightly viscid, tawny-ochraceous, becoming pale, margin at first whitish and slightly floccose from the veil;

gills adnate, sinuate, crowded, 2 lines broad, whitish, then purple-violet, at length blackish, edge whitish; stem 1-1½ in. long, 2-4 lines thick, attenuated downwards, base equal or slightly bulbous, fibrillose, white, stuffed, then hollow; ring median on the stem, striate; spores purple-brown, elliptical,  $10 \times 5 \mu$ .

*Agaricus (Stropharia) coronillus*, Bulliard, Champ., tab. 597; Cke., Hdbk., p. 198; Cke., Illustr., pl. 535.

On the ground. Small but firm; flesh of pileus 3-6 lines thick in the centre, white. Smell something like that of radishes. With the habit of *Psalliota*, but distinguished by the gills not being free from the stem.

#### *Stropharia ventricosa*. Massee.

Pileus about 1 in. across, campanulate then almost plane, broadly gibbous, even, smooth, slightly viscid in wet weather, tawny-ochraceous, paler when dry; flesh thick in the centre, becoming very thin at the margin, pale ochraceous; gills slightly adnate, almost free, ventricose, 2½-3 lines broad, rather crowded, thin, greyish-lilac then purplish-brown, margin pale; stem 2½-3 in. long, ventricose below the middle, 1-3 lines diameter at the swollen part, ending in a long, tapering, rooting base, pale yellow, minutely squamulose downwards below, brown within, ring large, persistent near the apex of the stem, white, pendulous, margin striate; spores elliptical, purple-brown,  $10 \times 6 \mu$ .

*Agaricus (Stropharia) ventricosa*, Fries, var. *major*, Cke., Hdbk., p. 200 (not of Fries); Cke., Illustr., pl. 1188. On the ground.

Growing in situ of *S. A.* Known from all other species by the extremely distinct rooting stem, and the large, persistent white ring. Gills almost free.

#### *Stropharia vibrata*. Fr.

Pileus 1-2 in. across, rather compact, convex then plane, smooth above, at length marked like squamules, yellow; gills adnate, rather thick, then purplish-umber; stem 1-1½ in. long, 1-2 lines thick, attenuated downwards, white, stuffed; ring median on the stem, white, persistent.

*Agaricus (Stropharia) vibrata*, Fries, Syst. Myc. Eur. i. 11, 1188. On the ground.

On the ground in pastures, &c.

Pileus yellow, hardly pelliculose, not glutinous, and firm like the stem.

Distinguished from *S. inuncta* and *S. albocyanea* by the compact flesh and stouter nature. Stem firm, stuffed, short, 1-1½ in. long, 3 lines and more thick, attenuated downwards, even, white, not squamose; ring superior, deflexed, white. Pileus fleshy, convex then plane, obtuse, obsoletely viscid, commonly dry, yellow, even, but often cracked into squamules; flesh compact, white. Gills adnate, without a decurrent tooth, crowded, plane, white then purple-umber. (Fries.)

**Stropharia melasperma.** Bull. (fig. 8, p. 351.)

Pileus 1-2 in. across, fleshy, convex then plane and often slightly depressed at the centre, soft, even, slightly viscid, soon dry, the cuticle often broken into patches, centre straw-colour, margin whitish; gills adnexed, deeply sinuate, crowded, ventricose, 2-3 lines broad, whitish, then greyish-violet, at length greyish-black; stem 1-2 in. long, nearly equal, silky-fibrillose, often curved at the base, becoming smooth, apex striate, stuffed, white; ring white, rather close to the pileus, deciduous; spores elliptical, brownish-purple,  $10 \times 6 \mu$ .

*Agaricus melaspermus*, Bulliard, Champ., tab. 540, fig. 1; Cke., Hdbk., p. 198; Cke., Illustr., pl. 536.

On the ground in pastures, &c. Flesh of pileus white, of the stem pale straw-colour. Resembling *S. coronilla* in general appearance and stature, but distinguished by the equal stem with the apex striate.

**Stropharia squamosa.** Fr.

Pileus 1½-3 in. across, flesh thin, convex then almost plane, often wavy, rather viscid, with scattered concentrically arranged, superficial floccose scales, yellowish-tan; gills adnate, crowded, 2-3 lines broad, brown then blackish, edge whitish; stem 3-4 in. long, 2-4 lines thick, tough, straight or slightly flexuous, villosa-squamose below the distant ring, smooth above, whitish, ferruginous towards the base, partly hollow; spores elliptical,  $12 \times 6 \mu$ .

*Agaricus (Stropharia) squamosus*, Fries, Syst. Myc. i. p. 284; Cke., Hdbk., p. 199; Cke., Illustr. pl. 553.

On the ground in woods, &c.

gills adnate, sinuate, crowded, 2 lines broad, whitish, then purple-violet, at length blackish, edge whitish; stem 1-1½ in. long, 2-4 lines thick, attenuated downwards, base equal or slightly bulbous, fibrillose, white, stuffed, then hollow; ring median on the stem, striate; spores purple-brown, elliptical,  $10 \times 5 \mu$ .

*Agaricus (Stropharia) coronillus*, Bulliard, Champ., tab. 597; Cke., Hdbk., p. 198; Cke., Illustr., pl. 535.

On the ground. Small but firm; flesh of pileus 3-6 lines thick in the centre, white. Smell something like that of radishes. With the habit of *Psalliota*, but distinguished by the gills not being free from the stem.

#### ***Stropharia ventricosa*. Massee.**

Pileus about 1 in. across, campanulate then almost plane, broadly gibbous, even, smooth, slightly viscid in wet weather, tawny-ochraceous, paler when dry; flesh thick in the centre, becoming very thin at the margin, pale ochraceous; gills slightly adnexed, almost free, ventricose, 2½-3 lines broad, rather crowded, thin, greyish-lilac then purplish-brown, margin pale; stem 2½-3 in. long, ventricose below the middle, 4-5 lines diameter at the swollen part, ending in a long, tapering, rooting base, pale yellow, minutely squamulose downwards, hollow, brown within, ring large, persistent, near the apex of the stem, white, pendulous, margin striate; spores elliptical, purple-brown,  $10 \times 6 \mu$ .

*Agaricus (Stropharia) merdarius*, Fries, var. *major*, Cke., Hdbk., Suppl., p. 383 (not of Fries); Cke., Illustr., pl. 1188.

On the ground.

Growing in tufts of 3-6. Known from all other species by the distinctly fusiform, rooting stem, and the large, persistent, striate ring. Gills almost free.

#### ***Stropharia obturata*. Fr.**

Pileus ½-1 in. across, rather compact, convex then plane, obtuse, almost dry, at length cracked into squamules, yellow; gills adnate, plane, whitish then purplish-umber; stem 1-1½ in. long, 3 lines thick, attenuated downwards, white, stuffed; ring tumid, white; spores purple-brown.

*Agaricus (Stropharia) obturatus*, Fries, Syst. Myc. Eur. i. p. 283; Fries, Hym. Eur., p. 285.

On the ground in pastures, &c.

Pileus yellow, hardly pelliculose, not glutinous, and firm like the stem.

Distinguished from *S. inuncta* and *S. albocyanea* by the compact flesh and stouter nature. Stem firm, stuffed, short, 1-1½ in. long, 3 lines and more thick, attenuated downwards, even, white, not squamose; ring superior, deflexed, white. Pileus fleshy, convex then plane, obtuse, obsoletely viscid, commonly dry, yellow, even, but often cracked into squamules; flesh compact, white. Gills adnate, without a decurrent tooth, crowded, plane, white then purple-umber. (Fries.)

***Stropharia melasperma.*** Bull. (fig. 8, p. 351.)

Pileus 1-2 in. across, fleshy, convex then plane and often slightly depressed at the centre, soft, even, slightly viscid, soon dry, the cuticle often broken into patches, centre straw-colour, margin whitish; gills adnexed, deeply sinuate, crowded, ventricose, 2-3 lines broad, whitish, then greyish-violet, at length greyish-black; stem 1-2 in. long, nearly equal, silky-fibrillose, often curved at the base, becoming smooth, apex striate, stuffed, white; ring white, rather close to the pileus, deciduous; spores elliptical, brownish-purple,  $10 \times 6 \mu$ .

*Agaricus melaspermus.* Bulliard, Champ., tab. 540, fig. 1; Cke., Hdbk., p. 198; Cke., Illustr., pl. 536.

On the ground in pastures, &c. Flesh of pileus white, of the stem pale straw-colour. Resembling *S. coronilla* in general appearance and stature, but distinguished by the equal stem with the apex striate.

***Stropharia squamosa.*** Fr.

Pileus 1½-3 in. across, flesh thin, convex then almost plane, often wavy, rather viscid, with scattered concentrically arranged, superficial floccose scales, yellowish-tan; gills adnate, crowded, 2-3 lines broad, brown then blackish, edge whitish; stem 3-4 in. long, 2-4 lines thick, tough, straight or slightly flexuous, villosa-squamose below the distant ring, smooth above, whitish, ferruginous towards the base, partly hollow; spores elliptical,  $12 \times 6 \mu$ .

*Agaricus (Stropharia) squamosus.* Fries, Syst. Myc. i. p. 284; Cke., Hdbk., p. 199; Cke., Illustr. pl. 553.

On the ground in woods, &c.



The stem is sometimes covered below the ring with reflexed fibrillose squamules, at other times strigosely tomentose.

Stem tubular, at first stuffed, soon hollow, slender, 3-5 in. long, 2 lines thick, equal, tough, pale above ferruginous downwards, powdered above the distant, entire, membranaceous ring, below the ring sometimes covered with squarrose squamules, at others tomentose and densely strigose; pileus fleshy, thin, hemispherical then expanded, often obtuse or with an obsoletely gibbous umbo, 1-3 in. broad, with a viscid pellicle when moist, not viscid when dry, ochraceous, covered with superficial, concentrically arranged, pilose squamules. Gills adnate, broad, crowded, plane, grey then blackish, edge white. (Fries.)

*Var. thraustus*, Fr. Differing from the typical form in the pileus, soon becoming glabrous. Slenderer than the type, pileus about 1 in. across, stem 4-5 in. high; spores elliptical,  $12 \times 6 \mu$ .

*Agaricus (Stropharia) thraustus*, Kalchb., Icon. Fung. Hung., t. 15, f. 4.

*Agaricus (Stropharia) squamosus*, Fr., var. *thraustus*, Fries, Hym. Eur., p. 286; Cke., Hdbk., p. 199; Cke., Illustr., pl. 554. Amongst grass.

*Var. aurantiaca*, Cooke. Agreeing in size with the typical form, but having the pileus orange or brick-red; spores elliptical,  $12 \times 6 \mu$ .

*Agaricus (Stropharia) squamosus*, Fries, var. *aurantiacus*, Cke., Hdbk., p. 199; Cke., Illustr., pl. 555.

Amongst grass.

#### \*\* *Merdarii*.

*Stropharia luteo-nitens*. Flor. Dan.

Pileus  $\frac{3}{4}$ -1 in. across, flesh thin, conico-campanulate, umbonate, viscid, yellow, even, margin squamulose; gills adnexed, ventricose, 1-2 lines broad, greyish-black; stem 1-1 $\frac{1}{2}$  in. high, 1 line or more thick, even, pruinose above the distant imperfect ring, whitish, hollow; spores elliptical,  $10-11 \times 6 \mu$ .

On dung in pastures.

Small, hardly squamose, stem short, fibrilloso-striate under a lens. (Fries.)

Cooke says that the present species also occurs on dung and sawdust.

*Agaricus (Stropharia) luteo-nitens*, Flora Danica, tab. 1057; Fries, Hym. Eur., p. 286; Cke., Hdbk., p. 200; Cke., Illustr., pl. 604.

Intermediate between *Stropharia squamosa* and *Psilocybe coprophila*, having the scaly pileus and ring of the former with the stature of the latter. Stem fistulose, firm, 2 in. long, 2 lines thick, equal, even, very minutely silky-fibrillose, pallid, pruinose above the distant, entire, spreading ring. Pileus rather fleshy, conical then hemispherical, umbonate, 1-2 in. broad, even, glabrous, but scaly towards the margin, viscid when moist, yellow and shining when dry; superficial scales soon disappearing, pallid. Flesh white. Gills subadnate, very ventricose, broad, plane, grey then blackish. (Fries.)

***Stropharia merdaria*. Fr.**

Pileus  $\frac{1}{2}$ -1 in. across, flesh thin, convex becoming almost plane, obtuse, glabrous, moist, hygrophanous, dingy yellowish-brown or pale bay; gills adnate, ventricose, about  $1\frac{1}{2}$  line broad, yellowish then umber; stem about 1 in. long, 1-1 $\frac{1}{2}$  line thick, dry, flocculose, pale, hollow; ring torn, fugacious; spores broadly elliptical,  $8 \times 5 \mu$ .

*Agaricus (Stropharia) merdarius*, Fries, Syst. Myc. i. p. 291; Cke., Hdbk., p. 200; Cke., Illustr., pl. 537.

On dry dung. Gregarious.

Stem generally about 1 in. long, when longer flexuous, at length almost even. Veil at first interwoven, then forming a thin ring, portions also remain at the margin of the pileus. Pileus pelliculose, but not truly viscid, almost cinnamon colour when moist, ochraceous when dry, margin at length finely striate. A much larger variety exists (with the habit of *S. aeruginosa*) having the pileus gibbous, yellow then straw-colour, stem partly stuffed. (Fries.)

Gregarious, subcaespitose; stem tough, stuffed with a distinct pith, 2-3 in. long, 2-3 lines thick, equal subflexuous everywhere silky and squamulose, dry, pale straw-colour, base with white down, apex striate due to the decurrent line-like teeth of the gills. I have seen it brown inside when old, ring incomplete, torn, the greater portion usually

adhering to the margin of the pileus, as in species of *Hypholoma*. Pileus fleshy, at first obtusely campanulate, then convexo-plane, gibbous, 2 in. broad, glabrous, pelliculose, rather viscid, yellow then straw-colour, margin thin, deflexed, even. Flesh white. Gills adnato-decurrent, rather crowded, plane, 3 lines broad, soft, very broad behind, pallid then brown from the blackish-brown spores. (Fries.)

***Stropharia stercoraria*. Fr.**

Pileus about 1 in. across, sometimes more, rather fleshy, hemispherical then expanded, even, glabrous, discoid, yellow; gills broadly adnate, with a decurrent tooth, 4 lines broad, whitish then umber or blackish-olive, sometimes brownish-purple; stem 4-5 in. long, 2 lines thick, equal, stuffed with a distinct pith, flocculose below the distant imperfect ring, rather viscid, whitish with a yellow tinge; spores elliptical,  $18-20 \times 8-10 \mu$ .

*Agaricus (Stropharia) stercorarius*, Fries, Syst. Myc. i. p. 291; Cke., Hdbk., p. 200; Cke., Illustr., pl. 538.

On dung. Closely resembling *Stropharia semiglobata*, but usually larger, and distinguished more especially by the distinct pith in the stem, by the portion of stem below the ring being at first flocculose, and by the much larger spores.

On dry dung. Stem stuffed with a distinct fibrous cord, 3 in. long and more, 2-3 lines thick, equal, clothed up to the viscid, narrow, somewhat spreading ring—which is situated about 1 in. from the pileus—with the flocculose and viscid veil, so that it appears smooth; yellow, silky-viscid when moist, when dry truly even, shining, yellowish white, without an evident veil. Pileus fleshy, thin at the margin, hemispherical then expanded, obtuse, orbicular, 1 in. across, with a viscid pellicle, naked, glabrous, even, or at length with the margin slightly striate, yellow. Gills adnate, very broad behind, 2 lines broad, rather crowded, umber-brown or olive-brown, of one colour, quite entire. (Fries.)

***Stropharia semiglobata*. Batsch. (fig. 17, p. 351.)**

Pileus  $\frac{1}{2}$ - $\frac{3}{4}$  in. across, persistently hemispherical, even, viscid, pale yellow; gills broadly adnate, 4-5 lines broad, plane, greyish, clouded with black; stem 3-5 in. high, 1-1 $\frac{1}{2}$  line thick, equal, glabrous, viscid, yellowish; ring imperfect,

inferior, soon stained with the dark spores; spores elliptical, ends rather acute, blackish-purple,  $12 \times 6 \mu$ .

*Agaricus (Stropharia) semiglobatus*, Batsch, Elench., fig. 110; Fries, Hym. Eur., p. 287; Cke., Hdbk., p. 200; Cke., Illustr., pl. 539.

On dung.

Smaller and more slender than *S. stercorearia*, stem hollow, straight, about 3 in. long, 1 line thick, equal, even, glabrous, yellowish, apex paler, becoming spotted with black by the spores, the rest smeared with the glutinous veil terminating abruptly above in an incomplete (not membranaceous) viscid ring that is distant from the pileus. Pileus rather fleshy, hemispherical, not expanded, very obtuse, usually about  $1\frac{1}{2}$  in. broad, even, viscid, yellow. Gills adnate, very broad, plane clouded with black. Spores as in *S. stercorearius*, purple-brown. Although occurring everywhere, yet varying little. (Fries.)

Solitary or gregarious, stipes 3-6 in. high, 2-3 lines thick, pale yellowish, hollow, more or less crooked, somewhat incrassated at the base, firm, glutinous, furnished with a ring, and generally dotted with black immediately beneath the pileus. Pileus half an inch to one inch and a half in breadth, exactly hemispherical, rarely becoming in large specimens plano-convex, yellow or pale reddish orange, very shining, and smooth, the flesh thin and white. Lamellae rather numerous, broad, fixed, horizontal (extending in a straight line, or nearly so, from the margin of the pileus to the stipes), beautifully mottled with the purplish-black sporidia. (Grev.)

#### B. SPINTRIGERI.

##### *Stropharia caput-Medusae*. Fr.

Pileus 1-2 in. across, fleshy, fragile, ovate then expanded, often lacunose, squamulose, discoid, umber-brown at the centre, circumference dingy ochraceous; gills adfixed, 3 lines broad, ventricose, clay-colour then pale umber; stem 2-4 in. long, up to  $\frac{1}{2}$  in. thick, whitish, below the ring with concentrically arranged imbricated, squarrose squamules, smooth above the superior, persistent ring; hollow; spores purple-brown, elliptic-fusiform,  $10 \times 4 \mu$ .

*Agaricus (Stropharia) caput-Medusae*, Fries., *Epicr.*, p. 216; Cke., *Hdbk.*, p. 200; Cke., *Illustr.*, pl. 540,

On pine woods near the roots of trunks. Subcaespitose.

Tufted, rather firm, but at the same time fragile. Stem hollow, base sub-bulbous, solid, 2-3 in. long,  $\frac{1}{2}$  in. and more thick, equally attenuated upwards, whitish, covered with crowded, imbricated, squarrose, brownish-white squamules below the spreading ring, powdered with white meal above. Universal veil floccoso-squamose, brown, at first enclosing the entire fungus, remaining as persistent scales on the stem, soon disappearing from the pileus; it is distinct from the partial or superior membranaceous ring, which is pendulous, white, with a floccose, swollen brown margin. Pileus fleshy, at first ovate, then convex-expanded, obtuse, or obtusely umbonate from the apex of the stem, about 3 in. broad, dry; when young, densely squarrosely squamose from the veil, soon naked, disc even, umber, lacunose and paler towards the margin, almost clay-colour; at length the disc is cracked into warts, the margin split into cracks, and the intermediate portion split into squamules. Gills adnate, ventricose, at first appearing to be free, lanceolate, or at length nearly ovate, 2-3 lines broad, fragile, not much crowded, whitish clay-colour then pale umber looking as if spotted with brown. Spores purple-brown. (Fries.)

Between the peculiar umber disc and the rest of the pileus, which is paler, tan-coloured, there is sometimes a marked circular depression. The disc is very soon naked, and becomes broken into granulose warts, leaving the rest of the pileus clothed with the peculiar blackish scales which look like sharp-pointed tufts. These soon vanish, while the stem remains clothed. (Stev.).

***Stropharia scobinacea*. Fr.**

Pileus 1-2 in. across, flesh thin, hemispherical then expanded, gibbous, finely sulcate, covered with blackish, adpressed, crowded squamules which eventually disappear, brownish, then greyish-violet near the margin, centre livid then yellowish; gills adnate, crowded, crenulate, reddish-white then purplish; stem 3-4 in. long, 2-3 lines thick, attenuated from the thickened base, fibrillose, white, apex mealy, hollow; ring superior, fugacious.

*Agaricus (Stropharia) scobinaceus*, Fries, Epicr., p. 217; Cke., Hdbk., p. 201.

On ash trunks. Subcaespitose; moist and fragile.

Caespitose. Allied to *S. caput-Medusae*, but not so showy, moist, and more fragile. Stem hollow, attenuated from the thickened (solid?) base, fibrillose, white, apex mealy; ring superior, fugacious, white. Pileus thin, hemispherical then expanded, gibbous, slightly sulcate, covered at first with crowded, adpressed, blackish, evanescent scales, at first brown, from the centre towards the margin livid then yellowish, margin greyish-violet. Gills adnate, crowded, crenulate, whitish flesh-colour then purplish. (Fries.)

The type of this species is nearly of the same stature as *H. caput-Medusae*, but the whole plant is thinner, more fragile, and less handsome. There are various intermediate forms which seem to connect the true combining features of both. I have found several well-marked stages between them. Spores ellipsoid-elongate,  $7-8 \times 3 \mu$ . (Plow.)

***Stropharia Jerdoni*. B. and Br.**

Pileus 2 in. across, campanulate, obtuse, with a broad fleshy umbo, ochraceous, dry, adorned with snow-white superficial, evanescent scales, cuticle not peeling off; gills adnate, sending a line down the stem, but not truly decurrent, pallid then brown, transversely striate; stem 3 in. high, 2-3 lines thick, cylindrical, snow-white and pulverulent above, brownish, with silky transverse scales below, hollow, ring superior, deflexed; spores purple-brown.

*Agaricus (Psalliota) Jerdoni*, B. and Br., Ann. Nat. Hist., n. 913, pl. xiv., f. 2; Cke., Illustr., 541; Cke., Hdbk., p. 201.

On fir-stumps. Berkeley in his diagnosis says the pileus is brown when dry, but in the type it is ochraceous, having probably changed with age.

***Stropharia spintriger*. Fr.**

Pileus 2-4 in. broad, rather fleshy, ovate then expanded, obtuse, even, glabrous, pale brown pinkish-tan then whitish; gills adnate, crowded, 1-2 lines broad, brownish; stem 2-3 in. long, 3 lines thick, equal, white, floccosely-fibrillose, apex naked, hollow; ring distant, thin, fugacious.

*Agaricus (Stropharia) spintriger*, Fries, Epicr., p. 217; Cke., Hdbk., p. 201; Cke., Illustr., pl. 542.

On trunks. Caespitose; pileus fragile. In Cooke's figure the stem is in every example thickened at the base.

Rather caespitose, stem hollow, about 3 in. long, 3 lines thick, equal or sometimes slightly ventricose; sometimes floccoso-squamose, at others fibrillose, white, apex naked (not mealy); ring an inch and more from the pileus, thin, white, fugacious. Pileus rather fleshy, thin, fragile, ovate then expanded, 3-4 in. broad, even, glabrous, soft to the touch, brownish then clay-colour. Flesh thin, white, almost absent from the margin. Gills adnate, linear, 1-2 lines broad, crowded, joined behind, brownish, rather deliquescent, edge same coloured, entire. Allied to *S. appendiculata*. (Fries.)

***Stropharia hypsipoda*. Fr.**

Pileus 1-2 in. across, flesh thin, convex then almost plane, glabrous, hygrophanous, brownish-yellow and with the margin slightly striate when moist, pale and with the margin even when dry; gills adnate then seceding, rather distant, pale then dark brown; stem 3-5 in. high, 2-4 lines thick, equal or slightly thickened at the base, glabrous, whitish, hollow; ring median, persistent; spores elliptical, brown,  $12-14 \times 6-7 \mu$ .

*Agaricus (Stropharia) hypsipus*, Fries, Epic., p. 218; Cke., Hdbk., p. 201; Cke., Illustr., pl. 619.

In damp places amongst grass, moss, &c. Solitary. Fragile.

Stem fistulose, fragile, 3-4 in. long, 2-3 lines thick, equal, glabrous, white; ring medium, distant from the pileus, membranaceous, white. Pileus rather fleshy, campanulate then convexo-plane, obtuse, 2 in. and more broad, even, glabrous, hygrophanous, livid-brownish when moist, margin slightly striate; altogether even (not corrugated), clay colour. Gills adnate, at length separating from the stem rather distant, white then brown. (Fries.)

**PILOSACE. Fries. (figs. 6, 7, p. 351).**

Sporophore differentiated from the stem; gills free from the stem; general and partial veil both absent, hence there is no ring on the central stem; spores purple-brown.

*Pilosace*, Fries, Nova Symb., p. 9; Cke., Hdbk., p. 196.

A peculiar genus, with the habit of *Agaricus*, but without a trace of a ring.

*Pilosace Algeriensis*. Fr. (figs. 6, 7, p. 351.)

Pileus 3-4 in. across, hemispherical with the margin incurved, becoming depressed round the gibbous disc, and with the margin more or less upturned and often split, snow-white, minutely silky; flesh thick except at the margin, firm, white; gills distant from the stem, narrow, rather distant, slightly broadest in front, dark purple; stem 2-3 in. long,  $\frac{3}{4}$  in. thick, equal, firm, even, silky, white, differentiated from the flesh of the pileus at its apex, solid; spores pip-shaped, brownish-purple,  $16-18 \times 8 \mu$ .

*Pilosace Algeriensis*, Fries, Hym. Eur., p. 283; Cke., Hdbk., p. 196; Cke., Illustr., pl. 618.

On the ground. Has up to the present only been found in one locality, but as it is difficult to distinguish in the field from *Agaricus campestris*, except in the absence of a ring, it may possibly have been passed over for that species.

AGARICUS. Linn. (emended). (figs. 1, 2, p. 351.)

Pileus fleshy; gills free from the stem, whitish or pink, finally dark reddish-brown or umber; stem usually differentiated from the flesh of the pileus, furnished with a ring; spores brownish or reddish-purple.

*Agaricus*, Linn., Syst. Nat. (1735), (in part).

*Agaricus*, subgen. *Psalliota*, Fries, Hym. Eur., p. 278; Cke., Hdbk., p. 192.

As previously explained, the genus *Agaricus* as interpreted by Fries, was by that author divided into several subgenera, and the original name *Agaricus* has been retained for those species included in the subgenus *Psalliota* of Fries.

*Agaricus* as here understood, is analogous with *Lepiota* in the white-spored series. There is no trace of a volva at any stage of development. The species are terrestrial, mostly growing in open pastures and on manured ground; some species, however, occur in woods, and one small exotic species, *A. geniculatus*, Briganti, grows on wood.



**Agaricus augustus.** Fr.

Pileus 4-6 in. across, almost globose at first then expanded, very obtuse, disc even, becoming minutely fibrillose, squamose towards the margin, pale brown, sometimes with a yellow tinge, margin paler, flesh  $\frac{1}{2}$ - $\frac{3}{4}$  in. thick, compact, white, slightly tinged with brown under the cuticle; gills free and distant from the stem, narrow, about  $\frac{1}{4}$  in., crowded, pale then brownish; stem 4-5 in. long,  $1\frac{1}{2}$ -2 in. thick at the base, becoming thinner upwards, smooth, even, whitish, or slightly tinged brown at the base; ring about  $\frac{1}{4}$  from the apex of the stem, very broad, persistent, cracked into more or less irregular portions on the under surface, stem solid; spores elliptical,  $6 \times 3-3.5 \mu$ .

*Agaricus (Psalliota) augustus*, Fries, Epicr., p. 212; Cke., Hdbk., p. 192; Cke., Illustr., t. 521.

In orchards, woods, &c. Fries says that it often grows on ant-hills. Esculent.

A very large and fine species. Pileus 4-5 in. broad. Stem  $1\frac{1}{2}$ -2 in. thick, attenuated upwards, white, but tinged with red when bruised. Flesh soft, white, unchangeable. Gills never acquiring a flesh-colour. (Cooke.)

**Agaricus elvensis.** B. and Br.

Tufted. Pileus 4-6 in. or more across, subglobose then hemispherical, fibrillose, broken up into large persistent brown scales, areolate in the centre; margin very obtuse, thick, covered with pyramidal warts; stem at first nearly equal, at length swollen in the centre, and attenuated at the base, 4-6 in. high, 2 in. thick in the centre, fibrillose and areolate below, nearly smooth within the pileus, solid, stuffed with delicate threads; ring thick, very large, deflexed, broken here and there, areolato-verrucose beneath; gills rather crowded,  $\frac{1}{4}$  in. broad, free, of a brownish flesh-colour; spores elliptic-oblong,  $8 \times 4 \mu$ .

*Agaricus (Psalliota) elvensis*, B. and Br., Ann. Nat. Hist., n. 1009; Cke., Illustr., tab. 522.

Under oak-trees, &c. Edible, delicious eating. Flesh of pileus  $\frac{3}{4}$  in. thick, red when cut. Allied to *Ag. augustus*, but differing in colour, warty margin of pileus, stuffed stem, &c.

**Agaricus campestris.** Linn. (fig. 1, p. 351.)

Pileus 3-6 in. across, globose then convexo-plane, dry,



silky, floccose or squamulose, whitish, flesh thick, white becoming reddish-brown when cut; gills free but rather close to the stem,  $\frac{1}{4}$ – $\frac{3}{4}$  in. broad, close, pink then flesh-colour, finally blackish-brown, subdeliquescent; stem 3–4 in. long,  $\frac{3}{4}$ –1 in. thick, subequal, white, stuffed, ring median, persistent, more or less torn; spores purple-brown, elliptical,  $7-9 \times 6 \mu$ .

*Agaricus (Psalliota) campestris*, Linn., Suec., n. 1205 (including allied species); Fries, Hym. Eur., p. 279; Cke., Hdbk., p. 194; Cke., Illustr., pl. 526.

In rich pastures. Esculent. Smell slight.

Pileus 2–5 in. broad, at first convex then plano-convex, white, silky or clothed with reddish-brown adpressed fibrillae collected into little fascicles; epidermis easily separating from the flesh, projecting beyond the gills and often curled back, fleshy; flesh firm, thick, white, more or less stained with reddish-brown, especially when bruised. Gills very unequal, at first of a beautiful pink, free, obtuse, and sometimes forked behind, broad in the middle; at length dark, mottled with the brownish-purple minute subelliptic sporules; the edge white and minutely denticulate. Stem 2–3 in. or more high,  $\frac{1}{4}$ – $\frac{3}{4}$  in. thick, nearly equal or sub-bulbous, white, beautifully but minutely silky, furnished with a thick spongy ring, generally above the middle, firm, consisting of fibres, those in the centre longer. Root consisting of a few white branched fibres, which are often beset with little knobs, which are the infant state of the plant. When quite young there is a fine silky universal veil. (Berk.)

Plant mostly gregarious, without odour, but with a grateful flavour. Pileus hemispherical, at length convex, and eventually plane, fleshy, 2–5 in. broad or more, white, or of a reddish tinge, or even uniform light brown; the surface is either smooth, slightly scaly, or (in the brown variety), more or less covered with prominent scales, formed partly of the substance of the plant, partly of hair-like fibres from the epidermis. Flesh soft, white, sometimes changing to a light reddish hue on being divided. Lamellae numerous, free, broad, ventricose, of a brittle substance, fine pink, red or flesh-colour, becoming dark vinous, fuscous, or even nearly black. Stipes firm, solid, 2–5 in. high, but mostly short, thick, white, sometimes rather bulbous at the base. Veil annular, white, variable, but mostly subpersistent. (Grev.)

*Var. silvicola*, Vittadini, Cke., Illustr., t. 529. Pileus smooth, shining, stem elongated, somewhat bulbous, hollow, ring large.

In woods.

*Var. pratensis*, Vittadini.

Distinguished by the small rufous scales of the pileus, and the flesh having a slight pink tinge.

*Var. hortensis*, Cke., Illustr., pl. 527. Pileus fibrillose or squamulose, brownish.

This is the cultivated form, which is very variable, including *var. elongatus*, Gard. Chron., 1860, p. 1061, with fig., and *var. Buchananii*, Gard. Chron., 1860, p. 1039, with fig.

*Var. vaporarius*, Otto.

Pileus even, with a brown pilose coat, which also covers the stem and leaves transverse fragments thereon as it elongates.

*Var. costatus*, Fr., Cke., Illustr., t. 528 A. Small. Pileus sulcate, repand. Ring large, persistent.

In woods.

*Var. rufescens*, Berk.

A distinct variety, which is rufous, like *A. vaccinus*, and whose flesh turns of a bright red when bruised. The gills are at first perfectly white. Berk., Outlines, t. 10, f. 3.

In pastures.

*Var. exannulatus*, Cke., Illustr., pl. 528 B. Pileus squamulose, stem elongated, equal, solid, ring evanescent or obsolete.

***Agaricus arvensis*. Schaeff.**

Pileus 5-10 in. or more across, conico-campanulate then expanded, at first rather mealy, becoming nearly smooth, even or cracked, flesh thick at the disc, becoming thin towards the margin; gills free, broadest in front, close, whitish then reddish-brown; stem 3-5 in. high,  $1\frac{1}{2}$ -2 in. thick at the base, slightly thinner upwards or almost equal, whitish, smooth, even, soft in the centre and filled with loose threads, ring pendulous, double, the outer portion more or less split; spores elliptical,  $6 \times 4 \mu$ .



*Agaricus (Psalliota) arvensis*, Schaeffer, t. 310, 311; Cke., Hdbk., p. 193; Cke., Illustr., pl. 523.

*Agaricus Georgii*, Sow., t. 304.

In pastures, &c., often in rings. Smell strong and not pleasant as in *A. campestris*.

Pileus 4–18 in. broad, white stained with yellow, convex, very thick, firm and tough, quite smooth or clothed with broad tawny more or less concentric adpressed scales; flesh yellowish when cut, juice yellow. Gills adnate (free, *Grev.*), broad, numerous, white or very pale flesh-colour, at length dark purplish-brown. Stem 2–5 in. high, 1–2 in. thick, firm, the centre loose and web-like; when bruised yellow, especially below. Distinguished from *A. campestris* by the almost white gills and the yellow stains when bruised. It grows to an enormous size. (Berk.)

Flesh white, unchangeable, gills for a long time pallid dry, not becoming reddish during the middle stage, not deliquescent. (Fries.)

*Var. villaticus*, Brond.

Grows to a very large size, pileus covered with brownish scales. Cke., Illustr., pl. 585.

*Var. purpurascens*, Cke.

Much smaller and more slender than the typical form; pileus even, smooth, tinged with purple that is deepest at the disc. Cke., Illustr., pl. 584.

*Agaricus silvaticus*. Schaeff.

Pileus 3–4 in. across, campanulate, then expanded, gibbous, the margin sometimes upturned, fibrillose or squamulose, brownish in the centre becoming paler towards the margin, flesh thin, whitish or tinged with brown; gills free, crowded, about  $\frac{1}{2}$  in. broad, rather thin, dry, reddish, then brown; stem 4–6 in. long,  $\frac{1}{2}$ – $\frac{3}{4}$  in. thick, equal, straight or curved towards the base, smooth, even, whitish, distinctly hollow, ring superior, simple, persistent; spores brownish tinged with purple, elliptical, apiculate,  $7 \times 4 \mu$ .

*Agaricus silvaticus*, Schaeffer, Icon., t. 242; Cke., Hdbk., 195; Cke., Illustr., pl. 530.

In woods. Distinguished from all the varieties of *Agaricus campestris* by the elongated hollow stem and the brownish

squamulose pileus. The stem is not bulbous at the base, as in *Agaricus campestris*, var. *silvicola*.

***Agaricus cretaceus*. Fr.**

Pileus 3-4 in. across, campanulate then expanded, and the margin sometimes upturned, naked, even, nearly smooth, or rivulose, sometimes cracked into areolae at the disc, whitish, or with a pale buff disc, flesh thin, soft; gills free, broadest in front and then nearly  $\frac{1}{2}$  in. broad, rather distant, for a long time whitish, becoming blackish-brown with a tinge of flesh-colour; stem about 3 in. long,  $\frac{1}{2}$  in. thick, usually slightly thickened at the base, smooth, whitish, sometimes slightly flexuous, distinctly hollow, ring almost median, simple, reflexed with the margin again ascending; spores  $5-6 \times 3.5 \mu$ .

*Agaricus cretaceus*, Fries, Syst. Myc. i. p. 28; Cke., Hdbk., p. 194; Cke., Illustr. pl. 524 (not of Bulliard).

On rich pastures, &c. Distinguished by the whitish pileus, distinctly hollow stem, and distant ring.

Stem hollow, cavity stuffed with a cobweb-like substance; firm, 3 in. long, 3-6 lines and more thick, attenuated upwards, even, glabrous, white, not spotted; ring superior, ample, reflexed, the margin erect, even, white. Pileus fleshy, lentiform-globose when young, then convexo-expanded, obtuse, 3 in. and more broad, dry, sometimes even, sometimes with the cuticle broken up into deciduous squamules, especially near the rivulose margin, altogether white. Flesh thick, white, unchangeable. Gills free, at length remote, ventricose, narrowest near the stem, crowded, persistently white for a long time, brownish when old. (Fries.)

***Agaricus pratensis*. Schaef.**

Pileus  $2-3\frac{1}{2}$  in. across, ovoid then expanded, becoming smooth or sometimes broken up into squamules more or less concentrically arranged, whitish, then greyish, flesh thick in the centre, thin towards the margin, white; gills free, rounded behind, about  $\frac{1}{2}$  in. broad, greyish, then brown; stem about 2 in. long,  $\frac{1}{2}-\frac{3}{4}$  in. thick, base thickened, smooth whitish, ring median, simple, usually deciduous; stem becoming more or less hollow; spores elliptical, apiculate,  $6 \times 3.5 \mu$ .

*Agaricus pratensis*, Schaeffer, Icon., t. 96; Cke., Hdbk., p. 193; Cke., Illustr., pl. 525.

On pastures and woods. Distinguished by the greyish gills becoming brown without any intermediate pink or fleshy tinge, and in being rounded behind, the median deciduous ring, and the more or less hollow stem.

***Agaricus haemorrhoidarius*. Schulz.**

Pileus 3-5 in. across, ovate then expanded, brownish, usually tinged with red or purple at the disc, covered with broad, adpressed scales or coarsely fibrilloso-squamose, flesh thick, and like that of the stem, becoming deep red when cut or bruised; gills free but near to the stem crowded,  $\frac{1}{4}$ - $\frac{1}{2}$  in. broad, rosy flesh-colour then purplish umber; stem 4-5 in. high,  $\frac{3}{4}$ -1 in. thick, subequal but more or less bulbous at the base, straight, hollow, white, silky, becoming blood-red when bruised, ring large, persistent; spores purple-brown,  $7-8 \times 5 \mu$ .

*Agaricus haemorrhoidarius*, Schulzer, in Kalchbrenner's Icon. Hung., t. 18, fig. i.; Cke., Hdbk., p. 195; Cke., Illustr., pl. 531.

In pine and other woods, and in open places under trees. Every part of the plant turns red when bruised. The stem in typical specimens is almost pure white and straight, and more or less bulbous at the base. Pileus becoming expanded, but remaining gibbous in the centre.

***Agaricus peronatus*. Massee.**

Pileus 4-5 in. across, hemispherical then expanded, pale dull ochraceous, densely covered with small brown silky scales that become larger towards the margin; flesh thick, white, unchangeable; gills very distant from the stem, crowded, about  $\frac{1}{4}$  in. broad, pink then pale purple-brown, margin entire; stem 5-6 in. long, 1 in. thick, equal, marginately bulbous at the base, distinctly hollow, bulb solid; ring large, spreading, below the ring and down to the margin of the bulb covered with large, white scales that point upwards, above the ring white and smooth; spores obliquely elliptical, purple-brown, smooth,  $6 \times 4 \mu$ ; cystidia absent.

In a pine-wood, Carlisle, Oct., 1886 (Dr. Carlyle).

The present species is allied to *Agaricus augustus* and *Ag. haemorrhoidarius*, but is distinct from both in the elongated stem being densely covered with large squarrose scales below the ring. The flesh of the stem becomes brownish when cut.

***Agaricus sagatus*. Fr.**

Pileus  $1\frac{1}{2}$ –2 in. across, convex then almost plane, even, glabrous, shining, pelliculose, reddish-brown, flesh white, thin; gills free, ventricose, about  $\frac{1}{4}$  in. broad, pinkish, then umber with a tinge of purple; stem about 2 in. long, about  $\frac{1}{4}$  in. thick, slightly attenuated upwards or subequal, distinctly hollow, pale, ring almost median, spreading, persistent; spores purplish-umber, elliptical,  $6 \times 3\text{--}4 \mu$ .

*Agaricus (Psalliota) sagatus*, Fries, Syst. Myc. i. p. 282; Cke., Hdbk., p. 196; Cke., Illustr., pl. 968.

In grassy places under trees. Distinguished amongst British species by its small size, bright reddish-brown or fulvous, glabrous, shining, pelliculose pileus, and the slender, hollow stem with the distant ring.

Stem very hollow, consequently appears to be fragile when compressed, 2 in. long, 3 lines thick, equal, glabrous, yellowish; ring distant, entire, persistent, white, pileus fleshy, thin, convex then plane, at length revolute, obtuse, 2 in. broad, even, glabrous, subpelliculose, foxy-yellow, flesh similarly coloured (?). Gills free, crowded, ventricose, umber. Approaches *Stropharia phaeosperma*, from which it is distinguished more especially by the free gills. (Fries.)

***Agaricus comptulus*. Fr. (fig. 2, p. 351.)**

Pileus 1–2 in. across, convex, then plane and with the margin sometimes upturned, obtuse, with an adpressed silkiness or glabrous, white, flesh thin except at the disc, white; gills free, crowded, about 2 lines broad, broadest in front, flesh-colour then rosy-brown; stem about 2 in. high, 2–3 lines thick, slightly attenuated upwards, whitish, flocculose in the centre at first, then hollow; ring median, fugacious, white then yellowish.

*Agaricus comptulus*, Fries, Epicr., p. 215; Cke., Hdbk., p. 196; Cke., Illustr., pl. 533.

In grassy places. A very neat little species, although

there does not appear to be anything to justify the specific name; the pileus often becoming quite plane, white and shining. The ring often completely disappears at maturity, when the species may cause a little perplexity, being under these conditions technically a *Pilosace*.

**Agaricus subgibbosus. Fr.**

Pileus scarcely 1 in. across, convexo-plane, subumbonate, even, yellowish, glabrous, but the margin silky-fibrillose; gills free, remote, white then greyish-brown; stem 1 in. long, 1-2 lines thick, imperfectly hollow; ring fugacious.

*Agaricus (Psalliota) subgibbosus*, Fries, Hym. Eur., p. 281; Cke., Hdbk., p. 196.

In woods, &c.

It is doubtful whether the present species in reality belongs to the British flora, as the specimens found and figured by Cooke, Illustr., pl. 532, are much larger than the typical form, and also differ in other points, as the large, persistent ring, &c. Cooke's reason for considering his specimens as belonging to the present species is explained as follows.

The form figured in Cooke's Illustr., t. 532, is referred provisionally to this species on the recommendation of the Rev. M. J. Berkeley. It is larger than the typical form. Pileus 2-3 in., stem 2-3 in. long,  $\frac{1}{2}$  in. thick. (Cke.)

**CHITONIA. Fries (emended). (fig. 4, p. 351).**

Universal veil distinct from the pileus, at maturity forming a distinct volva round the base of the exannulate central stem; gills free from the stem; spores brownish purple.

*Chitonia*, Fries, Hym. Eur., p. 277; Cke., Hdbk., p. 192.

Analogous in structure with *Volvaria* and *Amanitopsis*. An exotic genus, imported into this country.

*Chitonia* as defined by Fries, includes both ringed and ringless species, but as the old subgenus *Amanita*, which also includes some species furnished with a secondary veil and others without, has been divided into two genera,—*Amanita* furnished with a secondary or partial veil that forms a ring round the stem, and *Amanitopsis* not having a partial veil,



and consequently ringless,—hence, to be consistent, the genus *Chitonion* of Fries, including both ringed and ringless species, must be divided into two genera, *Chitonion* including the species without a ring, and the species furnished with a ring included in a genus that might be called *Chitoniella*.

***Chitonion rubriceps*. Cke. and Mass. (fig. 4, p. 351.)**

Pileus  $\frac{3}{4}$ –1 in. across, rather fleshy, campanulate then expanded, umbonate, often becoming depressed round the umbo, margin arched, slightly striate, even, reddish-brown; gills free, narrow, rather crowded, purplish-brown, remaining dry; stem about 3 in. long,  $1\frac{1}{2}$ –2 lines thick, equal, smooth, even, paler than the pileus, hollow, volva large, free, whitish, torn irregularly at the margin; spores elliptic-fusiform,  $12 \times 6 \mu$ .

*Chitonion rubriceps*, Cooke and Massee, Grevillea, vol. xv., p. 57; Cke., Hdbk., p. 192; Cke., Illustr., pl. 967.

On soil in the Aroid house, Kew Gardens. An exotic species, probably introduced in the soil along with some foreign plant.

#### OMITTED SPECIES.

***Peniophora Crosslandi*. Mass.**

Effused, thin, soft when moist, hymenium minutely setulose, pale grey, with a slight ochraceous tinge when dry; margin determinate, slightly raised, the whole fungus separable from the matrix when dry; cystidia numerous, the portion projecting above the hymenium conical,  $30\text{--}40 \times 10 \mu$ , colourless and studded with particles of lime; spores elliptical,  $6 \times 3 \mu$ .

On bark and wood of fir.

Resembling *P. gigantea* in being soft and fleshy when growing and cartilaginous and separable from the matrix when dry, but differing in the shorter cystidia and smaller spores. Patches 1–2 in. across. Halifax. (C. Crossland.)

***Guepinia obliqua*. Mass.**

Gregarious, about 2 lines high, hymenium slightly concave, oblique, passing downwards into a very short stem-like

base, entirely deep orange-red, glabrous; spores, elliptical, colourless, slightly curved, continuous,  $12 \times 5-6 \mu$ .

On dead wood.

The cup is shaped somewhat like a rabbit's ear, and attached obliquely at the back to a very short stem. Colour unchanged when dry. Soft and rather gelatinous when moist, horny when dry.

***Polyporus gilvus*. Schwein.**

Pileus fleshy, inclined to be tough, effuso-reflexed, soft, even, almost glabrous, zoneless, reddish-yellow; margin spreading, thin, acute; pores minute, rounded, naked, rusty yellowish-red, dissepiments entire.

*Polyporus gilvus*, Schweinitz, Carol., n. 897; Fries, Hym. Eur., p. 548; Stev., Fung. Brit., p. 199.

*Boletus impuber*, Sow., t. 195.

On trunks.

Effused for 2-4 inches, sometimes almost entirely resupinate. Pores about  $\frac{1}{4}$  mm. diameter, dissepiments thick, entire.

Included in the British Flora on the opinion expressed by Fries that *Boletus impuber*, Sow., is the present species.

Usually longitudinally effused, byssoid when growing in close places, soft to the touch, velvety, but sometimes so indistinctly as to appear smooth. (Fries.)

***Geaster saccatus*. Fr.**

Exoperidium cut into 6-9, thin, very acute and long pointed segments that become revolute; endoperidium globose, sessile; peristome acute, silky, surrounded by a distinct depressed circle; capillitium smoky, threads 4-5  $\mu$  thick; spores globose, minutely warted, 2.5-3  $\mu$  diam.

*Geaster saccatus*, Fries, S.M., 3, p. 16; Grev., 11, t. xx.

On the ground. From 1-2 in. across when expanded. Allied to *G. lageniformis*, Vittad., agreeing with *G. michelianus* in the acuminate apex before dehiscence, but quite distinct in the much thinner exoperidium, &c.

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